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BATHS OF ST. MORITZ

BY

C. VERAGUTH, M. D.

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Presented
by
J. Giger, Manager
of the
Hôtel du Lac

St. Moritzbath

THE

BATHS OF ST. MORITZ,

UPPER ENGADINE,

SWITZERLAND.

BY

C. VERAGUTH, M. D.

SPA PHYSICIAN AT ST. MORITZ
(DURING THE WINTER AT CANNES.)

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PREFACE.

THE present work was written primarily for the medical profession. It has been the author's endeavour to detail the advantages and the peculiar features of the Health-Resort of St. Moritz with the greatest possible impartiality and scientific accuracy.

St. Moritz is too well known and too highly appreciated as a health-resort to stand in need of anything approaching puffery. Experience shows, however, that erroneous views often prevail, not only among the general public but among physicians, as to the therapeutical results attainable here. Many seem to imagine that St. Moritz affords a panacea against all known and unknown diseases, or think of it as an *ultimum refugium*, to be resorted to when every other mode of treatment has failed. Others, falling into the opposite error, suppose a course of treatment at St. Moritz to be really of no greater efficacy than an ordinary [illegible] steel.

To ascertain and to record the truth, which here, as in so many other instances, lies midway between two extremes, is the object of this work. Should it lead any of my brethren of the medical profession to take an interest in the Health-Resort of St. Moritz, or to modify their views regarding it, my book will have fulfilled its object.

The scientific problems touched upon here and there may perhaps appear to the reader to be handled too categorically, but the narrow limits assigned to the work would permit of no critical examination in its pages of the maxims laid down. The author, however, is far from supposing that he has reached the ultimate truth on any question; on the contrary, he is quite ready to subscribe to Littré's words: "Plus vieillit le savant, plus il doit se courber en point d'interrogation."

The special indications set forth in the last chapter differ in many particulars from those commonly accepted; they are not based, however, on theoretical reasonings, but wholly upon the somewhat extensive professional experience of the author as spa physician at St. Moritz. In questions of practical medicine empiricism must long maintain its place. In spite of the great advances made by our science, we are still far from being able to give a satisfactory physiological explanation of all the appearances which the sick bed presents to us. Not only in balneo-therapeutics, but in every branch of practical medicine, we must, if we are candid, acknowledge that empiricism has as yet produced greater results than physiological deduction and experimental research.

Patients under treatment at St. Moritz, or intending to go there, will find much that may be useful to them in the first two sections of this book; the third section they had best leave unread. Medical facts but half understood do but mislead the general reader, and may easily make a hypochondriac of him.

C. VERAGUTH.

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I.

THE VALLEY AND ITS INHABITANTS.

I. The Upper Engadine.

THE ice-girdled mountain-mass of the Bernina, the hugest member of the Rhætian Alps, forms the boundary-wall separating the south-eastern corner of Switzerland from Italy. While the valleys on its south side fall off rapidly towards the Val Tellina, where the grape and the chestnut ripen on the sunny slopes, its northern outliers support that elevated district which, running from south-west to north-east, forms the upper half of the Engadine, and has the reputation of being the loftiest European valley in which human habitations are sufficiently numerous to be congregated into large villages. On the opposite side this valley is bounded by the serrated ridges and slender rocky pyramids of the Julier group; but in the south-west, immediately beyond the rocky gateway of the Maloja Pass, the broad valley falls precipitously towards the Val Bregaglia and the Lake of Como, opening up the smiling Alpine landscape to the bright sky of Italy. In the north-east, the direction of the chief water-course, this lofty plateau terminates behind the Lake of St. Moritz, where a range of wooded hills extends transversely across the valley, barely affording passage for the River Inn to pass through the

Charnaduras Ravine into the lower part of the Upper Engadine, where it continues its course at a level 300 feet lower.

The entire lofty plateau, averaging 1 1/2 miles in width, falls only 144 feet between the Maloja Pass (5941 feet) and the Lake of St. Moritz (5797 feet), a distance of about nine miles. The village of St. Moritz *(St. Moritz-Dorf)*, situated on the left mountain slope, above the lake, is the loftiest in the valley, lying at an altitude of 6089 feet, or 134 feet higher than the Maloja Pass. The *Baths* of St. Moritz *(St. Moritz-Bad)* are situated not far from where the River Inn enters the lake, at a height of 5804 feet above the sea.

The central masses of the stupendous mountains which are intersected by the Upper Engadine, as by a broad furrow, consist of igneous rocks, — chiefly granite, with some syenite and syenitic diorite. Over these is a torn and crumpled mantle of crystalline metamorphic rocks—principally gneiss and schists—with isolated deposits of true sedimentary strata.

The two mountain-chains which enclose between them the elevated plateau of the Upper Engadine attain an average height of a little less than 10,000 feet above the sea, so that on both sides they rise only about 4000 feet above the valley. The loftiest peaks, as for instance the gleaming white colossus of the Bernina, lie somewhat in the background, but little of them being visible from the main valley, and that only at the mouths of the different lateral valleys. The prospect of their vast sea of ice, which occupies a total area of more than forty square miles, is thus shut off from St. Moritz by the intervening heights. This, however, enhances the effect of the smaller but not less picturesque glaciers of the Julier and Languard groups.

The greater part of the surface of the valley is occupied by a series of beautiful sheets of water, the Lakes of Sils, Silvaplana, Campfèr, and St. Moritz, in which the youthful Inn bathes after leaving his cold cradle on the Lunghin and bounding down to the valley over the steep slopes near Maloja. That at least is popularly regarded as the source of the Inn, though the river receives considerably more water from the two southern lateral valleys, Val Fedoz and Val Fex, the glaciers at the further extremity of which feed copious torrents. The Fedoz brook empties itself into the Lake of Sils near Isola, while the other flows past Sils-Maria into the Lake of Silvaplana.

Lower down, the two depressions of the *Julier Pass* and the *Val Suvretta* open into the main valley from the north. These also contribute to the River Inn the water of their torrents, on the ancient deltas of which stand the sunny villages of *Silvaplana* and *Campfèr.*

Besides these, numerous lesser water-courses descend from the mountain-slopes all along the valley, and help to fill the spacious basins of the lakes, especially during the first half of the summer, when the sun is melting the remnants of the winter snows, which even at the end of June reach down to the margin of the forests. The Engadine is thus extremely well watered — more abundantly than almost any other Alpine valley — a circumstance that is not without influence upon the conditions of climate and vegetation mentioned below.

Let us take one more hasty look at the lower part of the valley. At the mouth of the Charnaduras Ravine lie *Celerina* and *Cresta*, and not far off *Samaden*, the chief place in the Upper Engadine. Here the broad valley of *Pontresina* opens from the south-east; this is in every respect the most important lateral valley of the Upper Engadine; it is watered by the Flatzbach, whose milky streams are fed by the Bernina Lakes and the Morteratsch and Roseg Glaciers,— two vast tongues of ice thrown out by the Bernina to the very bottom of the valley. This direction too is taken by the road leading over the Bernina Pass to Poschiavo and the Val Tellina.

Further down the main valley there follow each other at short intervals: *Bevers*, at the mouth of the valley of the same name, opening from the west, *Ponte-Camogask*, at the termination of the Albula Pass (leading from Bergün), *Madulein*, *Zuz*, and *Scanfs*. The valley, which is up to this point broad and carpeted with green meadows, now gradually contracts, till in the Lower Engadine, which begins at the Punt' Ota, beyond *Cinuskel* (5301 feet) it becomes a mere ravine. Here the Inn flows past the celebrated health-resort of *Tarasp* (3868 feet) to *Martinsbruck* (3395 feet), where, after a course of 59 miles and a fall of 2545 feet, it crosses the Swiss frontier and makes its way through the mountains of Tyrol to the plains.

The eleven villages of the Upper Engadine contain a fixed population of about 4000, — a sturdy race of mountaineers, of active mind, vigorous frame, and industrious habits. Owing to local circumstances they have been able to keep intact during many centuries (in addition to numerous peculiar customs and usages) their own special dialect, the *Romansch* language, and have even created a literature of their own, both in verse and prose. In consequence, however, of their active business relations with foreign countries, through the emigration and subsequent return of many of the natives of the valley, and still more through the tremendous pressure of the annually recurring influx of foreigners, the distinctively national characteristics have in great part been effaced. Only the massive old Engadine houses, with their cosy bay-windows and elegant lattice-work, behind which dark-red geraniums and luxuriantly blossoming pinks are arrayed, remain as memorials of the good old times and of the prosperity even then enjoyed. But they too are gradually disappearing, to make room for monster hotels and modern villa residences.

A national costume such as we find in the Bavarian and Austrian Alps never existed here. The strapping wenches with scarlet headgear and blue cotton frocks, and their martial-looking companions in knee-breeches and peaked Calabrian hats, are *Italians* from the valleys beyond the southern frontier, who have crossed the glaciers only to help gather in the hay harvest. The foreigner passing but a few weeks here rarely makes the acquaintance of natives of the Engadine, and their melodious dialect greets his ear less often than any other of the languages of modern Europe. The great majority of hotel-keepers, tradesmen, and work-people with whom the visitor comes in contact have immigrated from other districts of Canton Grisons, or from other parts of Switzerland, within the last few years, and the waiters and servants at the hotels, the guides, coachmen, etc., are also but seldom recruited from among the inhabitants of the valley. As a general rule the natives of the Engadine either take no part in the work of supplying the requirements of their very numerous visitors, or do so only as shareholders in some joint-stock enterprise.

To draw conclusions regarding the *hygienic conditions* of the periodical visitors from the statistics of mortality and disease among the natives would be as inadmissible in respect to the Upper Engadine as in any other case, since the social conditions to which the two classes are exposed are widely different. Nevertheless it is an important fact that the state of health of the fixed population is an excellent one, especially in summer, during which season diseases of an epidemic character scarcely ever occur. The most unhealthy time of year is the spring, when the snows are melting; pneumonia and rheumatic affections are then tolerably frequent. Tuberculosis is rare; cretinism and goitre are unknown here, though prevalent in the neighbouring Val Tellina.

Those who are specially interested in this subject will find a vast deal of information, collected with great industry and judgment, in Dr. Ludwig's publication 'Das Oberengadin' (Stuttgart, F. Enke, 1877). As we ourselves have recorded no observations bearing on this matter, we venture to make use of the two following tables from Dr. L[illegible]wig's work.

Of every 100 deaths there were caused by:

	In the Upper Engadine	In England	In Geneva
Want of vitality	2.5	6.2	?
Convulsions	5.1	6.0	1.9
Acute Exanthema	4.5	8.5	1.4
Inflammation of the brain ...	2.5	0.8	1.0
Diarrhœa	0.3	3.7	?
Dysentery...	1.4	0.3	?
Typhus abdom.	3.3	4.0	3.5
Pneumonia	8.9	5.8	6.0
Peritonitis	4.9	0.3	0.4
Delivery and childbed	0.9	0.7	0.9
Pulmonary consumption	4.1	11.4	11.7
Cancer	3.1	1.5	5.0
Heart disease	2.7	3.5	4.5
Apoplexy and paralysis	9.5	2.0	4.0
Dropsy	7.3	1.5	5.0
Accidents	2.7	2.8	2.7
Suicide	0.8	0.3	1.2
Old age	14.6	6.4	4.0

Of every 100 deaths from any cause whatever in each of the following periods of life, there were caused by:

Age	Want of vitality	Convulsions	Scarlet fever	Croup	Inflammation of the brain	Dysentery	Typhus abdom.	Pneumonia	Consumption	Cancer	Heart disease	Apoplexy	Dropsy	External violence	Old age
0— 1	20	36	—	2.5	7	5	—	11	—	—	—	—	—	—	—
1— 2	—	—	27	11	16	10.5	3	26	—	—	—	—	—	—	—
2— 5	—	10	29	10	—	6		4	4.3	—	—	—	—	—	—
5—10	—	—	30	7	—	—	—			—	—	—	—	—	—
10—20	—	—	—	—	5	—	9	4.5	16.6	—	14	—	—	5	—
20—30	—	—	—	—	3	—	13	3	8.3	—	3	3	—	23	—
30—40	—	—	—	—	5	—	10	5	6.2	—	5	5	2	2	—
40—50	—	—	—	—	2	—	8	8	17	4	2	18	4	8	—
50—60	—	—	—	—	1.2	—	—	15	9	11	5	18	7	5	1
60—70	—	—	—	—	—	—	5	8	2.1	7	5	14	12	5	13
70—80	—	—	—		1	1	1	9	—	2	1	15	19	1	36
80—90	—	—	—	—	—	—	—	7	—	—	—	8.5	14	—	64
90—100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100

* * *

The light-blue waters of the Engadine lakes are fringed with a border of dark fir-woods and lush green meadows, forming a background against which the rows of trim houses composing the villages stand out conspicuously. On the sunny side the larch *(Pinus Larix)*, standing either singly or in small groups, may be seen interspersed among the meadows. But on the moist and shady side the cembra-pine *(Pinus Cembra)* — the characteristic tree of the Rhætian Alps — waves its slender tufts of bluish-green needle-like leaves above the glittering margin of the lakes. Growing for the most part in dense woods, it extends up the slopes to a height of 2000 feet above the level valley; at this altitude its weather-beaten outposts wage a hard struggle for existence with the wild elements, which do their utmost year by year to set back the forest boundary. The cembra-pine throws out its thick roots far on all sides to get a firm foothold against the assaults of avalanches, the showers of stones, and the raging torrents; but its top is roughly dealt with by the stormy winds, and round its trunk and from its huge, boldly curved branches long white lichens hang, as though kind Nature had furnished her sturdy champion with a mantle of fur to defend him against the rigours of the long winter.

In these woods also grow the Alpine pine *(Pinus Picea,* Du Roi) and the mountain fir *(Pinus montana,* Miller*)*. "The common fir only occurs sporadically in the Upper Engadine under its Alpine form of *Friseana,* Wich. The last silver firs *(Pinus Abies,* Du Roi*)* are found at Scanfs (5347 feet)". (Christ, *'Pflanzenleben der Schweiz'.)*

Concerning the industrial uses of the cembra-pine, this representative tree of the Upper Engadine, the same author writes as follows in the excellent work from which we have just quoted: "The cembra-pine yields, as is well known, a shining, fine-grained, compact wood, whitish near the bark but reddish towards the heart, and soon decaying when exposed to the open air. It resists the attacks of many insects, though not of all, — the little beetle *Tonicus Cembræ* lives in the bark of this tree. In the Engadine the rooms are for the most part wainscotted with this wood, which becomes yellow with age, and its peculiar juniper-like odour is characteristic of these Alpine dwellings, in which the immense stove with its ladder and sleeping-place is conspicuous, and which are lighted by low windows opening obliquely in the thick stone walls. The nuts of the cembra-pine (called *nuschellas* in Romansch, *ziernüsschen* in the Lower Engadine) form a favourite dainty for the long winter evenings, and owing to long practice the people (especially the women-folk) are able to crack the hard shell with their teeth, and to separate and eat the small kernel, without interrupting for a moment the flood of small-talk in sonorous Romansch."

Deciduous trees are but scantily represented. Here and there a mountain-ash *(Sorbus Aucuparia)* or a willow has strayed into this region. The willow, however is pretty common in a dwarf, shrub-like form, and creeps along the watercourses up to the snow-limit. On the steep slopes the dwarf alder *(Alnus viridis)* binds the loose soil together, and the dry limestone rocks are clothed with the thick tufts of its darker relative, the dwarf Mugho pine *(Pinus Pumilio)*. But all the slopes, down to the level valley, are thickly studded with the bushes of the rusty-leaved alpen-rose *(Rhododendron ferrugineum)*, which in July, when its crimson flowers are open, spreads a brightly coloured carpet over such portions of the dark soil as are not occupied by heaths and mosses.

Animals of the chase are represented in the Upper Engadine chiefly by the chamois, numerous herds of which people the rocky belts of the Bernina valleys now that the Swiss game laws have secured it ten years' immunity from pursuit in this district. The harmless marmot is also abundant, and its shrill cries often reach the traveller's ear.

Like the ibex, the huge læmmergeyer has become extinct, and the bear, shunning the haunts of men, seldom leaves the dark wooded gorges of the Lower Engadine to pay us a visit; but the golden eagle still describes its circles high in the air, and in the rocky crevices of the Roseg the great-owl breeds.

The smaller beasts of prey, such as foxes and martens, are sufficiently numerous to embitter the lives of the few heathcocks which on cold spring mornings make the welkin ring with their amatory plaints. The red-legged partridge is also rather scarce, — less so the ptarmigan, which manages to find a livelihood high up near the snow-limit, under shady rocky knolls and among the débris. Here too the variable Alpine hare suns himself, but is no less scarce than his darker coloured relative in the valley. Within the last few years the roebuck has boldly attempted to establish itself in the forests bordering the Lake of Statz.

Late in the autumn numerous species of waterfowl visit the lakes of the Upper Engadine; while the quail, the woodcock, and the snipe select the Maloja and Bernina Passes for their passage into milder climes.

The tuneful tribe of songbirds is quite absent from our woods in summer, but the nutcracker utters his harsh cry in the tops of the pines, and the rapid hammering of the black woodpecker is often heard. Missel-thrushes and ring-ouzels, considerable flocks of which may be seen flying over the fir-woods in spring and autumn, forsake the valley for the treeless Alpine region during the summer, and the greater number of the different titmice and finches accompany them. On the heights the air is then well peopled with birds up to the loftiest ridges, where the light-pinioned Alpine jackdaw circles screaming round the crags and the keen-scented raven soars high over the valley.

In the Upper Engadine the *insect tribes* are represented by only a few species, some of which, however, are very numerous; this is the case with certain species of butterflies, which are distinguished from those of the plains by the greater brilliancy of their colouring and their darker tints.

The waters of the Engadine contain but few species of *fish*; and of these probably not more than three are indigenous. The quaint-looking bull-head or miller's thumb *(Cottus Gobio*, L.) is found principally in the River Inn, but sometimes also in the lakes; it affords the angler an excellent bait for trout. The grayling *(Thymallus vulgaris*, L.*)* occasionally ascends from the lower parts of the valley of the Inn into the Lower Engadine, and it is said that formerly it was often caught still higher up. But the monarch of the Engadine waters is the trout *(Salmo fario*, L.*)*. The clear, swift-flowing, icy water of the Inn suits this fish admirably; it thrives here in a most satifactory manner, and is even found in the lofty Bernina lakes (7316 feet). Two kinds of trout are caught in the district of the River Inn. The smaller variety attains a weight of $^1/_2$ — 1 lb., and is remarkable for its peculiar colouring: the grayish-blue body is speckled with a few black blotches, much larger than those found in other varieties of trout. The second kind inhabits the lakes of the Upper Engadine; it is a gaily coloured fish of very considerable size, sometimes weighing as much as 20 or 30 lbs.

The Lakes of Sils and Statz contain considerable numbers of a carp-like fish, *Scardinius Erythrophthalmus,* L. Professor Asper, to whom we owe these notes, believes that this fish does not belong to the indigenous fauna, but has been brought hither by man. He holds the same opinion regarding the pike (*Esox Lucius,* L.) and the burbot or eel-pout (*Lota vulgaris,* L.) of the Lake of Tarasp. Curiously enough the *Phoxinus lævis,* Ag., (the American minnow), a small fish found in most of the other mountain lakes of Canton Grisons, is absent from the Engadine.

The Engadine lakes swarm with tiny crustaceans, no larger than a dot, known, on account of their springing movements, as "water-fleas". In the lowland lakes they are the prey of various species of fish, but here their only enemies are the young trout. In order to turn to account this abundant supply of food, some young *white-fish (Coregonus albus)* were brought from America a few years ago and introduced into the Lake of St. Moritz; they will doubtless prove a valuable addition to its finny inhabitants.

Some of the lower orders of animal life are well represented in the lakes of the Engadine. On their shores, hiding under stones, water-beetles and other aquatic insects are numerous; two varieties of water-snails *(Limnæa peregra* and *L. auricularia)* are not unfrequent. The larvæ of neuropterous insects are plentiful beneath the stones, where they lie in wait for their prey, and there are also vast numbers of the fresh-water polyp *Hydra rhætica*, which is distinguished by its size and red colour from allied species.

In the vicinity of Crestalta the Lake of Silvaplana abounds with the elegant tree-like phytozoon *Fredericella*, which grows here more luxuriantly than in any other place with which we are acquainted.

We must mention one other natural product, that bears a strange resemblance to the sea-urchins of the ocean. In a small inlet of the Lake of Sils, between Sils-Maria and Sils-Baseglia, there may be found not far from the banks completely globular, prickly bodies from the size of an apple to that of a baby's head. They consist entirely of larch leaves, quantities of which lying on the shore furnish the material for these balls. The valley wind from the Maloja blows in this inlet in such a manner as to impart a rotatory movement to the water; the heaps of larch-needles are thus whirled round and round, and the curious formations above described are the result.

* * *

The visitor arriving towards the end of June sees the Engadine in its bridal attire. The mountains, whose sharply defined contours stand out boldly against the clear blue sky, are covered with a thick mantle of snow extending far down into the pastures. So dazzled is the eye by the gleaming, glistening heights, that the broad belt of forest reaching down to the shores of the lakes appears almost black by comparison. But in the valley itself everything is verdant and blooming. The larches are arrayed in their vernal garb of fragrant light-green foliage; leaning against their dark trunks are the luxuriant flower-heads of the yellow gentian, and the earliest rhododendrons are already opening their crimson chalices. And where in the forest-shades the sun has still left a patch of snow unmelted, the soldanellas lift their pretty fringed bells above the carpeting of withered larch-leaves that covers the yet wintry ground.

But in the lush green meadows encircling the lakes there are now blossoming in wonderful exuberance all the gaily coloured representatives of the Alpine flora which in summer we must search for on the upper slopes, where they grow far less plentifully. By the side of the pale anemone blue gentians, large and small, are flowering, and above the different varieties of richly dyed primulas and ranunculuses the doronicum proudly lifts its bright-yellow starry disk.

The visitor arriving in our upland valley no earlier than August sees nothing of all these floral splendours, for at the end of July the mower's pitiless scythe lays all low, and the flowers go with the fragrant hay to fill the spacious barns of the Engadine peasantry. After this the emerald verdure of the meadows fades, giving place to a paler hue, and on the mountain-slopes the pastures begin to put on their autumn robes of russet brown. Only along the course of the brooks that bring to the valley the last meltings of the winter's snow does the turf still retain its early verdure; it is here that we must now seek the flowers which in spring-time we trod upon in the valley at every step, for down in the forests the dark-blue racemes of the monkshood and the spreading white rays of the thistle reign almost alone. Only the graceful bells of the trailing Linnæa, growing plentifully in the woods, still remind us of the delicate fragrance of the vernal flora.

But at whatever season we visit the Engadine—whether in the early spring, or in the height of summer when the glaciers are reflecting the sunlight from their myriad icy pinnacles, or when in autumn the first fall of snow whitens the entire landscape—it can at no time fail to make a deep impression upon us, and after we have returned to the misty lowlands we shall again and again call to mind, with emotions of gratitude to the beneficent Creator, the glorious Alpine valley in which we have found renewed health and strength.

◆

2. St. Moritz.

At the place where the River Inn issues from the Lake of Campfèr a ridge of wooded hills runs transversely across the valley, narrowing it so as to barely leave room for the river; the Julier road, which branches off at Campfèr, runs along the mountain-slope high above the swift-flowing stream. But soon a bridge leads over to the right bank, the valley expands, and all at once the *Baths of St. Moritz* lie before the traveller: hotels large and small, elegant villas, slender church spires, pretty châlets, and various other buildings are seen picturesquely grouped in the green valley and on the adjacent hills. Behind them glimmers the lake, and on the high ground above it to the left rise the trim houses of the *village* of St. Moritz. On the right, behind the Statz Forest, the broad valley of Pontresina opens, with the Languard group beyond it, while above the hills of the Charnaduras Gorge the eye loses itself in the long vista of the lower valley, which is in appearance closed by the mountains of Zernetz. Behind us, up the valley, the broad particoloured ridge of the Margna beckons to us above the larch-woods, and opposite to it the massive rocky pyramids of the Julier group, with their gleaming blue glaciers, rise to a dizzy height.

The gently sloping left side of the valley is covered with thin larch plantations and with meadows, extending far up the acclivities towards the Alpine pastures of the Piz Nair. Along this side of the valley runs the upper road directly connecting Campfèr with the village of St. Moritz and rejoining at the entrance to the latter the road leading to the Baths. On the right the granite terraces of the Piz Rosatsch fall off somewhat abruptly to the valley, and at the foot of the forest-clad base of this mountain rise the two chalybeate springs that have conjured up all these splendid buildings and imported so much animation into this once quiet Alpine vale.

The spell, it is true, was not of rapid operation. As long ago as 1525 the celebrated Paracelsus praised in glowing terms the healing powers of the St. Moritz waters, and in the course of the eighteenth century the health-resort attained a certain degree of prosperity, but at the beginning of the present century the arrangements were still of a most primitive character. Visitors lodged in one of the three inns or in private houses in the village; at the spring itself there was only a small cottage, in the unenclosed ground floor of which the patient scooped the water with an iron ladle out of a trough of stone. A room on the first floor afforded shelter in case of rain, and the traveller caught in a shower could dry his clothes at the fire.

At last, in 1831, a joint-stock company took a twenty years' lease of the spring and built a Kurhaus, which, though it afforded no accommodation for visitors, contained a refreshment-room, a pump-room, and six bath-rooms the water for the baths was heated in a large boiler.

In 1853 — at the instance mainly of the late Dr. Brügger — the "New" or Paracelsus Spring was tubed, and the defective tubing of the old spring repaired. This gave occasion for constituting the still existing company, which in 1854 took the springs on lease for fifty years and at once set about erecting what is now called the Old Kurhaus. In 1856 visitors were first accommodated with lodgings at the Baths themselves; but the 130 beds were soon found quite insufficient for the ever increasing number of patients, and the company therefore resolved upon the erection of the New Kurhaus, which was completed in 1866. All the other hotels at the Baths are of still more recent date.

The *Kurhaus*, which is not only the oldest but also the largest of the different establishments, can accommodate 350 visitors at once. The older part, which extends along the mountain-side, contains on the ground floor the Baths. Adjoining its left wing is the Trinkhalle of the Paracelsus Spring, while the right wing is connected with the new Kurhaus and contains the Old Spring. The rooms over the baths are warm and quiet, and being small they are not expensive; for one or the other of these reasons they are preferred by many of the regular visitors.

The two-storied New Kurhaus, built at a right-angle to the old one and to the direction of the valley, contains numerous rooms and apartments provided with every luxury that is expected in a first-class modern hotel. The middle wing, facing the Maloja Pass, is reserved for the spacious dining-hall (in which 400 guests can find seats), and the adjoining refreshment-rooms. A corner wing par-added to it, completed only in 1886, contains an entire suite of new public rooms, which it would not be easy to match as regards their architectural decorations and the elegance of their interior appointments. The ball and concert room (with a stage for theatrical performances) is finished in the Renaissance style; adjoining it is a music-room in the Pompeian style, and through an Old German ante-chamber we reach the ladies' drawing-room, richly decorated in the Louis Quinze style, and the ground floor of the main building. In 1890 the left half of the latter was re-arranged, and now contains only public rooms. Adjoining the ladies' drawing-room is a cosy reading-room, well supplied with journals, etc., then follows a series of entertainment and coffee rooms, all connected with each other by a broad verandah. The left part of the ground floor is occupied mainly by the offices of the Hotel and Kurhaus Management, and by the physician's consulting-rooms.

In front of the Kurhaus is the spacious *Kurplatz* with its music pavilion, fountains, and lawn-tennis court; to the left of it, on the other side of the river, stands the *Inn Villa*, also belonging to the Kurhaus and containing quiet family apartments. On the hill behind the Baths the Protestant Church stands out prominently against the dark woods; divine service is performed here (in French) every Sunday.

Next to the Kurhaus the principal hotels are the *Victoria* and the *Du Lac*. The former, opposite the Paracelsus Spring, has 250 beds, the latter, five minutes' walk from the springs, in a fine, lofty situation, 240 beds. The smaller hotels, which are on the whole somewhat quieter than the larger ones, are named as follows, in the order of their distance from the Baths; *Hof St. Moritz* (50 beds), *Engadinerhof* (50 beds), *Central* (40 beds), *Bellevue* (110 beds); further there are the following "villas": *Mayer* (10 beds), *Stark* (10 beds), *Berry* (20 beds), *Pidermann-Brügger* (40 beds), *Edelweiss* (30 beds), *Flütsch* (25 beds). Apartments may also be had in the Badstrasse, between the Hôtels Victoria and Du Lac, where a row of well-stocked shops affords the visitor an opportunity of purchasing almost anything that may be required. The new post and telegraph office, erected in 1887, is also situated here; the chemist's shop is on the further side of the bridge.

Near where the River Inn issues from the lake, on the left bank, a beautiful new Roman Catholic Church has been built; opposite to it stands the spacious *Casino*, with its extensive public rooms and an orchestra of its own. It was erected in 1885 by a joint-stock company.

From the bridge there are two roads leading to the village; the lower one, skirting the lake, is used chiefly by pedestrians; the upper one leads past a number of the above-mentioned hotels, so that there is a brisk carriage traffic along it. This road leads past the English Church, which is situated overlooking the lake, half-way between the village and the Baths. Just before reaching the village we pass the *Hôtel Belvédère* (90 beds), standing apart from the rest.

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The *Village of St. Moritz*, with 500 inhabitants, a Protestant and a Catholic church, and a fine new school-house, is situated on the sunny ridge across which runs the road to Celerina, and is the loftiest village in the Engadine. The closely clustered houses with their flat roofs, rising on the steep slope above the lake, have a picturesque appearance and remind us from a distance of a mediæval Italian hill-town. On approaching nearer we are struck by the curious intermixture of modern hotel buildings and old—not always picturesque—Engadine houses, all crowded together in the village street, which is now much too narrow and steep for the present traffic.

Among the hotels the *Kulm* (300 beds), situated on the loftiest open terrace, claims the first place; like several of those mentioned below, it is kept open for the reception of winter visitors.

The post and telegraph office is situated in the lower part of the village. Near it lie the Hotels *C. Badrutt* (80 beds), *Beaurivage* (45 beds), *Steffani* (40 beds) and *Suisse* (45 beds), and the *Villas Schmidt* (22 beds), *Berry* (20 beds), *Rungger-Coray* (25 beds), *Tognoni* (12 beds), *Flugi* (40 beds), and *Joos* (30 beds).

In the midst of the village stand the *Hotels Wettstein* (70 beds), *Tognoni* (24 beds), *Gartmann* (45 beds), *Post* (45 beds), *Helvetia* (30 beds), *Veraguth* (50 beds), and *St. Moritz* (30 beds).

In the vicinity of the Hotel Kulm are the Pensions *Peter* (80 beds), *Pidermann* (25 beds), *Grüner Berg* (12 beds), and *Rovinatsch* (12 beds).

Including the hotels at Campfèr, a mile from the Baths, we have a total of 2675 beds for visitors in the health-resort; in the height of the season almost all of these are occupied.

It is impossible to give definite figures regarding the average number of visitors, no general register being kept. Those only who drink the waters (and pay the spa fee) are entered in the Visitors' List, but the majority confine themselves to the baths and the enjoyment of the pure air. If we estimate the number of persons making a stay of some duration at St. Moritz during an average summer season at between 4000 and 5000 we shall not overshoot the mark.

The statistics of those drinking the waters during the past few years are unfortunately not at my disposal. From 1872 to 1881 the different nationalities were represented as follows:

	Registered Visitors	Germany	Austria-Hungary	Switzerland	Netherlands	England	France	Russia	Belgium	Sweden and Norway	Denmark	Italy	Spain and Portugal	Turkey, Greece, and Danubian Principalities	America	Asia, Africa, and Australia	Unascertained
1872	1348	337	61	283	33	216	74	53	9	—	5	211	1	6	53	6	—
1873	1387	306	52	305	18	226	86	47	6	—	8	255	5	7	63	3	—
1874	1410	359	86	282	14	211	106	47	5	3	10	212	9	4	61	1	—
1875	1386	381	90	264	20	192	99	50	16	7	8	168	2	10	76	3	—
1876	1452	426	76	252	19	223	87	28	19	7	18	205	8	10	67	7	—
1877	1625	478	43	314	52	242	119	19	21	10	7	225	6	1	79	9	—
1878	1435	374	55	250	27	263	101	34	13	7	—	206	4	4	86	11	—
1879	1474	430	85	268	29	200	105	40	12	2	8	179	5	5	86	20	—
1880	1663	500	61	323	21	228	114	41	31	9	2	198	13	4	104	12	2
1881	1723	446	110	299	31	241	131	42	21	7	5	227	15	3	132	18	—

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St. Moritz does not possess a theatre, but it affords all the other social amusements that one expects to find now-a-days at a first-class health-resort.

There is no lack of musical productions to delight the visitor's ear. A band of eighteen musicians performs every morning at the springs, and in the afternoon and evening at the Kurhaus. In the Casino a German band of 24 performers gives two concerts daily, and the Hôtels Victoria, du Lac, and Kulm have also a band of their own.

In addition to all this, performances for the benefit of various charities, entertainments by travelling artistes, balls, firework displays, etc., impart the necessary variety to the daily round of life at the health-resort. There are also numerous lawn-tennis grounds, and rowing and sailing boats can be had on the lake.

But these amenities, which are after all common to every health-resort, are of small account in comparison to the sublime enjoyments which the magnificent mountain scenery of the environs affords even to those who are averse to or incapable of strenuous bodily exertions. What is elsewhere found only in limited measure, or is unattainable except at the price of the severest efforts, lies in the Engadine before the house-door and on the highways.

Almost level carriage-roads lead to the very foot of the glaciers; in a brief space of time the patient ass carries us up to mountain heights commanding the entire labyrinth of glaciers and peaks from Monte Rosa to the Ortler. But even on the well-made footpaths in the valley or on the cushioned seats of the rowing-boats we are charmed by the constantly changing landscapes, in which the lovely and the sublime are happily mingled. Sturdy climbers, however, who look with scorn upon the broad and well frequented paths, find no lack of rocky ridges and snowy peaks on which to test their powers of endurance.

It is beyond the scope of this work to give a detailed description of the excursions that may be made from St. Moritz, but for the sake of such of our readers as are unacquainted with this health-resort we must enumerate as briefly as possible the points most in favour with excursionists.

For short walks the map and the numerous signposts afford all the guidance that is necessary; for drives there is a choice of all kinds of vehicles, which can be hired at the prices named in the authorised tariffs. There is also regular omnibus and tramway communication with Sils, Silvaplana, Maloja, Samaden, Pontresina, and the Morteratsch Glacier. For the less arduous mountain ascents, tourists shunning fatigue may avail themselves without hesitation of the services of one of the donkeys or mules waiting so patiently by the roadside at various spots. For the longer mountain and glacier excursions, which should under no circumstances be undertaken alone, and by invalids never without their doctor's consent, a well trained and in every respect reliable corps of guides s in readiness.

The walks in the vicinity of the health-resort have in part been laid out by the management of the Kurhaus, in part by the *St. Moritz Kurverein*, a society constituted a few years ago by residents in the locality, and having for its object the embellishment of the health-resort. To it are due most of the guide-boards and seats by the road-side.

I. Short Walks, for a Morning or Afternoon.

(The time named does not include the return, but is calculated for slow walkers.)

(a) Level or with Very Slight Ascent.

1. To the *Meierei* (50 min.) a much frequented restaurant situated between the Lakes of St. Moritz and Statz, half-way to Pontresina. Several woodland paths lead to it, the favourite one skirting the lake. We can return round the lake, past the Fall of the Inn, and through the village; or by boat.
2. To *Pontresina* (2 hrs.) past the Meierei and the Lake of Statz.
3. Through the Village of St. Moritz to *Campfèr*, and back to the Baths (1 1/2 hrs.).
4. To the *Untere Alpina* (restaurant), situated immediately above the upper road to Campfèr (1/2 hr.).
5. To *Crestalta*, a wooded hill with restaurant, situated above the Lake of Silvaplana (1 1/4 hrs.).
6. Through Campfèr to *Silvaplana* and back through Surlei and Crestalta (3 hrs.).

7. Numerous short *woodland walks* in the immediate neighbourhood of the Baths and Village.

(b) With a Considerable Ascent.

8. To the *Quellenhügel*, immediately behind the Kurhaus (1/2 hr.). There is a choice of several paths.
9. To the *Johannisberg* (1 hr.). Ascent behind the Kurhaus; return by the path leading down to the Lake of Campfèr and the Crestalta Promenade.
10. To the *Hahnensee*, half an hour's walk above the Johannisberg.
11. To the *Suvretta Valley*, above the Untere Alpina (2 1/2 hrs.), returning through the Gorge of Campfèr.
12. To the *Obere Alpina* (1 hr.; restaurant), on the margin of the forest above the village of St. Moritz. Ascent past the Untere Alpina or the English Church; back through the village.
13. From the Obere Alpina in 3/4 hr. to the *Alp Nova* or *Alp Giop*.
14. To *Celerina*, past the Fall of the Inn and through the *Charnaduras Gorge* (1 1/2 hrs.), returning by the old carriage-road and through the village of St. Moritz.

II. More fatiguing Excursions, for a Whole Day.

15. Over the *Fuorcla di Surlei* to the Roseg Valley (5 hrs.), and back through Pontresina. Unpractised mountaineers will do best to *ride* up to the summit of the pass, after having ordered a carriage to meet them at Roseg.

16. Through Pontresina to *Muottas Muraigl;* 2 1/2 hours from Pontresina (bridle-path).
17. The *Piz Languard;* ascent from Pontresina in 3 1/2 hours.
18. *Piz Nair* (3 1/2 hours), direct from the Baths; it is advisable to take a guide.
19. *Piz del Ova Cotschna* on the Rosatsch (2 hrs.), by a newly constructed footpath.

Mountaineering excursions demanding an amount of exertion incompatible with medical treatment are not mentioned here.

III. Drives for a Morning or Afternoon.

20. To *Maloja* (2 hrs.), from there walk to the *Schlosshügel* (1/2 hr.), or to the beautifully situated *Lake of Càvloccio* (1 hr.).
21. Through *Sils-Maria* (1 hr.) to the *Valley of Fex* (to the restaurant, 1 hr.), from there walk to the glacier (1 hr.).
22. Through Pontresina to the *Roseg Valley* (2 1/2 hrs.; restaurant) from here on foot to the *Alp Ota* or to the *Glacier* (1 hr.).
23. To the *Morteratsch Glacier.* Through Pontresina to the Kutscherplatz (2 hrs.), from there on foot to the restaurant (1/2 hr.), and then to the *point of view* on the glacier (3/4 hr.).
24. Through *Samaden* to *Bevers* (2 hrs.), from here on foot into the *Valley of Bevers* (1 hr.).

IV. A Day's Excursion by Carriage.

25. To the *Bernina Hospice,* viâ Pontresina (3 1/2 hrs.). From there on foot to the *Alp Grüm* (1 1/4 hrs.) or into the *Heuthal* (2 hrs.).

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Before closing this chapter it may be well to say a few words respecting the hygienic arrangements of the health-resort.

Drinking water of excellent quality is plentiful everywhere, and is laid on at high pressure (by means of hydrants) even into the top stories. An analysis by Professor Husemann certifies that the water is of first-rate quality and free from organic impurities.

From a sanatory point of view the *apartments* in the different hotels are scarcely open to criticism. In the extremely dry climate of the Upper Engadine damp houses are almost an impossibility, and there is an abundance of air and light.

In many of the private apartments and all of the public rooms well constructed stoves and fireplaces are provided, to warm the air in cool weather. In some of the dining-rooms the ventilating apparatus might be improved, but the great ventilator is the diurnal "valley wind", which brings about the periodical renewal of the atmosphere, sometimes in only too boisterous a manner. The closets are of course all provided with a plentiful supply of water and with automatic basins.

The continuous removal of the waste water from the kitchens, privies, etc., of all the houses both in the Village and at the Baths is effected by a network of cast-iron pipes, which discharge into the lake at a considerable distance from the banks. This system of sewerage (Waring's) was put down at a great outlay in 1885. In the same year all the stagnant ditches in the neighbourhood of the health-resort were drained and filled up; this was simply a precautionary measure, as they had never given rise to organisms prejudicial to health.

The larger hotels are *lighted* by gas, and the Hôtel Kulm has for some years past been illuminated by the electric light. The lighting of the roads at night is still in part very defective.

In consequence of the great dryness of the air the *cleansing and watering of the roads* to free them from dust occupies more time and involves more trouble at St. Moritz than in most other places. The hydrants are employed for this purpose, but only in the immediate vicinity of the health-resort are the roads watered sufficiently to prevent the dust from becoming troublesome after continued fine weather.

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3. The Season.

THE season at St. Moritz lasts from June 15th to September 15th, and is at its height from July 10th till the end of August. During this period good apartments can be had only with difficulty or not at all, unless engaged beforehand; before and after these latter dates every visitor will easily find accommodation suited to his wishes and to his purse.

Invalids whose principal need is rest and quiet will derive most benefit from a stay at the health-resort either before or after the season proper, when visitors are fewer and more attention can be given to each individual case. Some there are, however, who derive pleasurable excitement from the bustle that prevails during the height of the season, when the stream of coming and departing guests constantly affords them new matter of entertainment. Besides, even at this time each can decide for himself whether to live in more or less retirement. Those who wish to share in all the amusements and amenities of social life at the health-resort will do well to take up their quarters in one of the large hotels, whose inmates always form themselves into more or less exclusive circles. Up to the present a point of union accessible and agreeable in the same degree to the entire body of visitors is wanting at St. Moritz.

That visitors are allowed to make their own rules of etiquette, and excite no more remark by appearing in a well worn tourist costume than if attired in broadcloth or silk, is an advantage possessed by St. Moritz over many similar places. This metropolitan trait is due to the international character of its society, and to the variety of purposes and objects that bring people to the Engadine.

Those who are careful of their health will not omit to provide against cool weather even in the height of summer. A winter suit, a fur cloak, or a warm overcoat may perhaps lie unused in the visitor's trunk during his entire stay here, but in certain circumstances they may prove very serviceable. For walking tours very warm clothing may always be dispensed with, but for drives lasting until after sunset a travelling rug, etc., should invariably be provided, as even in the height of summer the evening fall in temperature may be very perceptible.

Even for short mountain excursions good shoes — strong laced boots with low, broad heels — are indispensable; a high heel is not only extremely uncomfortable to the foot in descending the mountains, but also often gives rise to sprains.

The manner of spending the day, the mode of life, and the dietary must vary for every patient, according to the nature of his complaint. But one point may be laid down as a golden rule for all, and cannot be too often repeated: *The quieter the patient keeps during the first week after his arrival, and the more he avoids all bodily exertion at the commencement, the more easily he will be acclimatised, and the less likely it is that* *the course of treatment will undergo a disagreeable interruption.* This rule is often disregarded, intentionally or not. Temptations abound on all sides; attracted by the charm of the surroundings, the patient deceives himself as to his capacity for enduring fatigue, and imagines that nothing can tire him, till a sudden fit of lassitude, often lasting several days and jeopardising the success of the treatment, compels him to acknowledge that he has overtaxed his energies.

Every one visiting the High Alps for the first time for the sake of his health should ask the doctor's advice not only as to the special course of medical treatment he is to be subjected to, but also in regard to the above apparently immaterial but in reality highly important matter; and this should be done at the very outset, without waiting to experiment on one's own account, — either wasting time or doing oneself actual injury.

The assemblage of visitors at St. Moritz is recruited almost exclusively from the cultured and well situated classes of society, and has on the whole an aristocratic tinge. Questionable elements have always been absent, so that ladies unaccompanied by gentlemen need not hesitate to take up their quarters at St. Moritz. To bring children who are not themselves in need of treatment is only advisable when servants to attend to them can also be brought, so as not to disturb in any degree the repose and quiet necessary to the patient's recuperation.

Those for whom the regular use of the waters, both internally and externally, is prescribed, will do best to lodge at the baths; those, on the other hand, who rely chiefly upon the mountain air and quiet for their restoration to health will find equally good accommodation in the Village. Besides, in the morning there is an omnibus service between the Village and the Baths, the vehicles starting at intervals of an hour.

The terms for visitors *en pension* (including three meals and attendance) are about Frs. 9 per day in the larger hotels, in the smaller ones from seven to eight francs. The board is invariably good and abundant—for many invalids only too abundant.

Both at the Baths and in the Village small rooms can be had for two or three francs a day; the average price for a good single bedroom is Frs. 5. For servants Frs. 5 per day is charged.

The Spa Fee, which is payable only by visitors drinking the waters, amounts to Frs. 12; baths and douches cost from 1 to 2$^1/_2$ francs.

The *St. Moritz Mineral Water* forms an important article of commerce, and is exported to all the principal cities of Europe. Being carefully bottled, it keeps clear and unchanged for months, and can therefore be medicinally employed at other health-resorts and at the patient's home.

Prices.

	Unpacked.	Including Packing.
100 bottles F.O.B. St. Moritz	Frs. 45. —	Frs. 53. 50
100 half-bottles » »	» 35. —	» 42. —

Tariff for Vehicles.

From the Baths of St. Moritz to	1 Horse		2 Horses			Stay
	1—2 Pers.	3 Pers	4 Pers.	5 Pers.	6 Pers.	
	Frs.	*Frs.*	*Frs.*	*Frs.*	*Frs.*	*Hours.*
Dorf St. Moritz or Campfèr...	2	3	4	5	6	1
» » » viâ » ...	7	9	16	20	24	2
Celerina	6	8	16	20	24	2
Samaden	7	9	20	24	28	2
Pontresina	9	11	20	24	28	2
« viâ Samaden	10	12	20	24	28	2
Morteratsch Glacier	12	15	25	29	33	3
Bernina Houses	14	17	28	32	36	—
Bernina Hospice...	18	22	35	39	43	—
Roseg Valley	18	22	—	—	—	—
Bevers	9	11	20	24	28	2
Valley of Bevers as far as Aëla	14	17	—	—	—	—
Ponte...	11	13	20	24	28	2
Valley of Camogasco	20	24	—	—	—	—
Madulein	12	15	25	29	33	3
Zuz	13	16	25	29	33	3
Scanfs...	14	17	27	30	34	—
Capella	16	18	30	33	36	—
Zernez	28	33	45	53	60	—
Silvaplana, Morning	5	6	16	20	24	1
Silvaplana, Afternoon	7	9	20	24	28	2
Valley of Fex	16	19	—	—	—	—
Maloja	12	15	25	29	33	3
» and Plan da Folla ...	15	18	30	34	38	—
» and Casaccia	18	21	35	39	43	—
Summit of the Julier Pass ...	14	17	35	39	43	—

Tariff of Guides' Fees for Mountain Ascents.

	Fee for 1 Guide Frs.
Piz Nair	8
» » and back through Suvretta	10
Piz Julier (Munteratsch)	25
Through Suvretta and Val Bever	15
Piz Suvretta	12
Piz Traunter-Ovas	20
Piz d'Err	40
Cima da Flix	40
Piz Albana	10
Piz Pülaschun	12
Piz la Crêf	25
Piz Murtaröl	15
Piz Lunghin	10
Piz Duan	40
Piz della Margnia	20
Piz Muretto	20
Monte d'Oro	30
Cima di Rosso	30
Monte Sissone	40
Cima di Largo	50
Forno Glacier as far as the "Glacier Table"	15
» » » » » » "Kettle"	20
Fex Glacier	10
Piz Tremoggia	40
Piz Giüz	25
Piz Led	20
Capütschin Pass through Roseg to St. Moritz	40
Fuorcla da Fex	18
Piz Corvatsch, and back to St. Moritz	14
» » » » » Pontresina	16
Fuorcla Surlei	10
Piz Surlei	10
Piz Rosatsch	8
Piz Ot	15
Over the Fuorcla da Bever to Weissenstein	25
Piz Uertsch (Albula)	25
Piz Kesch	40
Die Schwestern	20
Piz Languard	8

	Fee for 1 Guide Frs.
Piz Languard for sunset or sunrise	12
Piz Languard and La Pischa	12
Through the Heuthal viâ Livigno to Bormio	40
Through the Val di Campo and Val Viola to Bormio	45
The Diavolezza tour	12
» » » and to Mont Pers	15
Morteratsch Glacier	7
» » as far as Isla Persa	10
Boval (cabane)	10
Piz Cambrena	40
Piz Palü	50
Piz Bellavista	40
Piz Zupo	50
Silberspitze	45
Cresta Güzza	60
Piz Bernina	70
Piz Morteratsch	30
Piz Tschierva	20
Agagliouls	10
Roseg Glacier	7
» » as far as the Sella Pass	25
Over the Sella Pass to Poschiavo	40
» » » » » Chiesa (Val Malenco)	50
» » » » » Bernina Hospice	50
» » » » and through Bellavista	50
Sella summits	30
Piz Roseg	80
Piz Glüschaint	30
Piz Capütschin	25
Piz Compatsch	10
Alp Grüm	8
Piz Lagalp	9
Piz Alv	9
Alp Muragl	5
Piz Padella	10
Piz Saluver	12
Las Trais Fluors	25

4. Routes and Intermediate Stations.

As yet the Engadine has no railways, and let us hope that it will be long before it is invaded by them; for the iron tracks would make an ugly streak through the beautiful landscape, and with the first whistle of the locomotive we should lose the pleasant consciousness that here at least we can escape the turmoil and the din of the busy world without. On the other hand every visitor will appreciate the endeavours now being made to bring the railway nearer to the northern end of the Engadine.

The journey over the mountain-passes affords, it is true, plenty of enjoyment. The Alpine highways of the Grisons are famous throughout Europe for their skilful construction and freedom from danger, the vehicles employed are without exception comfortable and safe, and the traveller is completely protected against inclement weather. But nevertheless invalids and weakly persons find the long carriage-ride fatiguing, especially in the heat and dust of summer, and it is therefore advisable for them to break the journey at one of the intermediate stations mentioned below. Taking the time occupied by the diligences as our standard, the length of the carriage journey is as follows: From Chur, over the Julier Pass 12 hours, or over the Albula 13½ hours; from Chiavenna 8 hours; from Landeck 17 hours.

The [illegible] between the different railway stations and [illegible]

a. The Regular Diligence Service.

The diligence is [illegible] with the trains, and can [illegible] an unlimited number of passengers. If [illegible] is desired, a place [illegible] in the [illegible] or in the [illegible]. Passengers finding no room in the diligence [illegible] will be conveyed to their [illegible] in a [illegible] vehicle called a Beiwagen [illegible]. Every traveller is allowed [illegible]

Summer Fares in the Federal Diligences.

	One Seat in the	
	Coupé or Banquette	Interior or Beiwagen
	Frs.	Frs.
Chur—Sch[illegible]—Julier—St. Moritz	23. 55	21. 55
Chur—Lenz—Julier—St. Moritz	21. 30	19. 40
Chur—Albula—St. Moritz	24. —	20. —
Chiavenna—St. Moritz	14. [illegible]	11. 75
Landeck—St. Moritz	37. 50	30. 55
S[illegible]—P[illegible]—St. Moritz	24. 30	20. —

b. Extra Post Carriages.

These can be had to start at any time; they are supplied by the Swiss postal authorities, change horses at the same places as the diligences, and travel at a prescribed speed.

Summer Tariff for Extra Post Carriages.

	Changing Carriages		Without changing Carriages	
	1 horse	2 horses	1 horse	2 horses
	Frs.	*Frs.*	*Frs.*	*Frs.*
Coire—Lenz—Julier—St.Moritz	121. 10	204. —	136. 70	223. 50
Coire—Albula—St. Moritz ...	128. 10	216. 25	144. 70	237. —
Chiavenna—St. Moritz	77. 50	131. —	87. 50	143. 50
			Austr.	*currency*
Landeck—Nauders	—	—	*fl.*23. 90	*fl.* 41. 31
			Frs.	*Frs.*
Nauders—St. Moritz	117. 30	211. 75	135. 10	234. —
Sondrio—Poschiavo—St. Moritz	123. 30	215. 50	136. 10	231. 50

(c) Private Carriages.

These may be obtained at any station, and are best hired through the hotel-keepers. The fares are fixed by a tariff; there is no changing horses, but as a rule they make as good time as the diligences, and very rarely give occasion for complaint. For families, etc., they form the most agreeable mode of travelling.

Tariff for Private Carriages.

	2 horses	4 horses
	Frs.	*Frs.*
Coire—Schyn—Julier—St. Moritz	110. —	220. —
Coire—Churwalden—Albula—St. Moritz	100. —	200. —
Chiavenna—St. Moritz	90. —	180. —
Landeck—St. Moritz	280. —	560. —
Sondrio—Poschiavo—St. Moritz	160. —	280. —

and 10 per cent. gratuity for the driver.

Extra stoppages during the journey, Frs. 5 per day for each horse.

Three-horse carriages are not to be recommended. Such luggage as cannot be taken into the carriage, it is best to have forwarded by parcel post*, the express luggage waggons being no cheaper and less reliable.

Letters should be addressed either to *St. Moritz-Bad* or *St. Moritz-Dorf*, as the case may be, the two post offices being separate. *St. Maurice*, a village in the west of Switzerland (Canton Valais), must not be confounded with *St. Moritz.*

I. Direct Routes of Travel.

We give below the times of starting from the different centres of European traffic for St. Moritz in the summer of 1889. This is done only in order to give the reader an approximate idea of the time required to reach the Health-Resort from any given point; the time tables are of course subject to alteration, though changes are seldom made in the international express train service and the Swiss diligence service.

(a) Direct Routes viâ Coire.

1. From London and Brussels.

London dep.	9^{40} A. M.
Brussels dep.	7^{04} P. M.
Basle dep.	7^{25} A. M.
Coire arr.	1^{15} P. M.

2. From Paris.

Paris dep.	8^{40} P. M.
Basle dep.	7^{25} A. M.
Coire arr.	1^{15} P. M.

3. From Berlin.

Berlin dep.	7^{20} P. M.
Frankfort dep.	7^{00} A. M.
Basle dep.	2^{10} P. M.
Coire arr.	10^{12} P. M.

4. From Munich.

Munich dep.	7^{15} A. M.
Lindau dep.	1^{05} P. M.
Coire arr.	6^{13} P. M.

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* In Switzerland there is no limit to the weight of articles sent by parcel post.

Diligence from Coire to St. Moritz.

	viâ Julier	*viâ Julier*	*viâ Albula*
Coire dep.	11^{00} P. M.	6^{00} A. M.	6^{30} A. M.
St. Moritz-Bad arr.	10^{50} A. M.	7^{15} P. M.	8^{00} P. M.

(b) Direct Routes viâ Chiavenna.

1. From Italy.		*2. From the Riviera.*	
Rome dep.	1^{30} P. M.	Marseilles dep.	8^{20} P. M.
Genoa dep.	3^{30} A. M.	Genoa dep.	3^{30} A. M.
Milan dep.	7^{30} A. M.	Milan dep.	7^{30} A. M.

Como dep.	9^{12} A M.
Colico dep.	2^{05} P. M.
Chiavenna arr.	3^{10} P. M.

3. From Basle viâ the St. Gothard.

Basle dep.	8^{00} P. M.
Lugano dep.	6^{10} A. M.
Menaggio dep.	9^{45} A. M.
Colico dep....	2^{05} P. M.
Chiavenna arr.	3^{10} P. M.

Diligence from Chiavenna to St. Moritz.

Chiavenna dep.	10^{30} P. M.	6^{45} A. M.
St. Moritz-Bad arr....	6^{30} A. M.	3^{15} P. M.

Direct Route viâ Landeck.

Vienna dep.	7^{35} A. M.
Innsbruck dep.... ...	10^{10} P. M.
Landeck arr.	11^{44} P. M.

Diligence from Landeck to St. Moritz.

Landeck dep.	3^{30} A. M.	Landeck dep.	12^{20} P. M.
Tarasp dep.	2^{05} P. M.	Tarasp dep.	5^{40} A. M.
St. Moritz-Bad arr. ...	9^{30} P. M.	St. Moritz-Bad arr. ...	1^{50} P. M.

II. Intermediate Stations.

Apart from the fatiguing effect upon debilitated persons, of an uninterrupted journey from distant parts to St. Moritz, there are many cases in which the sudden transference from the lowlands to lofty mountain regions and *vice versâ*, though not actually dangerous, may cause sufficiently disagreeable symptoms, which do not show themselves if the change of climatic conditions is rendered less abrupt by a shorter or longer stay at a sub-alpine station.

In a later chapter we shall enumerate the cases chiefly calling for this preliminary measure. Here we shall do no more than briefly mention those intermediate stations which lie on the routes of travel, and which, owing to their favourable situation and their excellent hotels, enjoy the special favour of travellers. More distant summer resorts, often and very properly visited by invalids before or after a course of treatment at St. Moritz, such as the Lake of Lucerne, the Bernese Oberland, the Black Forest, the Lake of Geneva, the Italian lakes, etc., are left out of account here.

The stations mentioned are arranged in the order in which they are reached in travelling to St. Moritz.

a Intermediate Stations on the Julier and Albula Routes.

1. *Ragatz* ([illegible] feet), railway station an hour's journey from Coire, famous thermal springs, at the mouth of the Tamina Gorge.
2. *Coire* or *Chur* (1035 feet), capital of the Canton of Grisons, with beautiful surroundings; well adapted for a long stay in spring and autumn.

3. *Waldhaus Flims* (3615 feet), in the Grisons Oberland, two hours' drive from Reichenau. A favourite summer resort, in which it is difficult to obtain accommodation during the season without ordering rooms in advance.
4. *Thusis* (2447 feet), in a beautiful and mild situation at the junction of the Schyn and Via Mala Gorges.
5. *Churwalden* (3976 feet), six miles from Coire, and
6. *Parpan* (4937 feet) a short distance further on, both situated in the vicinity of the Lenzerhaide and the Stätzerhorn.
7. *Tiefenkasten* (2844 feet) at the point where the Julier and Albula routes cross.

   All the above stations may be made use of in crossing either the Julier or the Albula Pass.
8. *Mühlen* (4793 feet) in the Oberhalbstein, belongs to the Julier Route.
9. *The Baths of Alvaneu* (3084 feet), with powerful sulphur spring, in a sheltered and rather warm situation, and
10. *Bergün* (4491 feet) in an open, romantic hollow, lie on the Albula road.

(b) Intermediate Stations on the Maloja Route.

1. Of the numerous places on the banks of the *Lake of Como* (698 feet), Bellagio and Menaggio are the most frequented.

   As a rule it is only in autumn that they can serve as intermediate stations after a visit to the Engadine, their summer climate being too oppressively hot.

1. *Chiavenna* ([illegible] feet), an old Italian town at the end of the Splügen Route and at the mouth of the valley of Bregaglia.
2. *Promontogno* ([illegible] feet), on the Bregaglia road, with a [illegible] and beautiful promenade through chestnut groves to Soglio.
3. *Casaccia* ([illegible] feet), the last village in the valley of Bregaglia, at the foot of the Maloja.

2) Intermediate Stations on the Finstermünz Route.

1. *Innsbruck* ([illegible] feet), the capital of Tyrol.
2. *Landeck* ([illegible] feet), where the carriage-road through the Lower Engadine begins.
3. *Tarasp-Schuls* ([illegible] and [illegible] feet respectively), in the Lower Engadine, famous alkalo-saline springs.

3) Intermediate Station on the Bernina Route.

1. *Le Prese* (3150 feet), sulphur baths on the lovely Lake of Poschiavo, near the borders of the Val Tellina.

◆

II.

CURATIVE AGENTS.

1. The Climate.

THE Rhine from the Splügen to Feldkirch in the east, the Ill and the Rosana in the north, the Adige and the Adda in the west and south are the boundaries of an upland region which is divided into two unequal halves by the shallow longitudinal furrow of the Engadine, and which consists in the main of the mountain-masses of the Rhætian Alps.

In all Europe there is no other elevated table-land of equal extent. This lofty territory embraces an area of more than 4000 square miles, and only round its edges is it cut into by a few valleys whose lowest part is less than 3000 feet above the sea-level. Towards its centre few of the valleys reach to within 5600 feet of the sea-level.

The entire remaining portion of the Alpine Chain, from the Mediterranean to the Adriatic, is penetrated to its very core by deep valleys with a campestral climate, so that the characteristics of a lofty plateau are nowhere found in it. Second in magnitude to the Rhætian Alps are the Pennine Alps, with the Monte Rosa Chain; their transverse diameter from the Valley of Aosta to that of the Rhone measures 37 miles, while the Bernese Alps are only 18, and the Hohe Tauern Mountains about 27 miles broad. But the transverse diameter of the Rhætian Alps, measured from the valley of the Rhine at Coire to the Val Tellina, amounts to about 51 miles.

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To the fact of their thus forming an immense elevated plateau, the Rhætian Alps, and the Engadine as their loftiest valley, owe the chief peculiarity of their climate—its eminently continental character. While the equalising effects of the oceanic climate, which make themselves felt in a predominating manner throughout the entire area of Central Europe, are not without influence upon the most deeply incised valleys and isolated mountain-peaks of the rest of the Alps, the lofty plateau of the Engadine counteracts these effects by local factors, and thus creates a climate of its own.

The continental character of the climate of the Upper Engadine is seen especially in the great dryness of the atmosphere, and in the relatively considerable daily and seasonal fluctuations in temperature: cool nights, warm days; cold winters, hot summers. For instance, the annual fluctuation of the mean extremes amounts at Bevers to 95° Fahr., and at Sils to 81° Fahr., while at Zurich it is only 60.8° Fahr.

If the ***Vegetation*** of a valley be any guide to its climatic conditions, the great height to which the zone of forest-trees extends is alone sufficient to indicate that the Engadine enjoys an exceptionally favourable climate, and especially a warm summer temperature. For on the northern slopes the Cembra-Pine here forms dense woods up to a height of 7217 feet, and isolated specimens are found 750 feet higher, while in the Tâtra Mountains its mean limit is 5118 feet, and in Southern Bavaria 6125 feet. Fine specimens of the Norway Spruce are found in the Engadine at a height of 6725 feet, while its growth ceases in the Sudeten Mountains at 3800 feet, in the Jura at 4600 feet, in the north of Switzerland and in Canton Ticino at 5900 feet, and in the Dauphiné at 6200 feet. The mean limit of the Larch is 6700 feet in the Engadine, 6200 feet in Ticino, 6050 feet in the north of Switzerland, 6000 feet in Southern Bavaria, and 4900 feet in the Tâtra. (Christ).

The limit of *cultivated plants* is also higher in the Engadine than in other mountainous parts of Europe. If agriculture is not carried on here to the same extent as was the case at the beginning of this century, this is owing to a change not in the climatic but in the social conditions. The ease with which corn can now be transported from distant countries, and the greater quantity of hay now required, explain why most of the fields have been converted into meadows during the last few decades.

In 1822 Kasthofer saw the winter rape in full blossom at Samaden on September 2nd, and barley and oats ripe for harvest at Celerina. Rye and barley are still cultivated at Zuz (5616 feet) and Scanfs; at Pontresina (5905 feet) the potato ripens, and at Sils (5895 feet) there stands a solitary cherry-tree which blossoms every year, though it seldom matures its fruit. The village gardens are gay with flowers, and the carrots, lettuces, spinach, and cauliflowers grown here excel those of the lowlands in tenderness and flavour.

The lush Alpine pastures, clothed with a dense growth of grass and broad-leaved herbs, on which thousands of cows and sheep find plentiful fodder during the summer, extend in many parts of the Engadine up to the *snow-line*, which is here drawn at about 9850 feet, while in the High Tâtra it descends to 7500 feet, in Southern Bavaria to

8825 feet, in the north of Switzerland and Ticino to 8858 feet, and in the Dauphiné to 9163 feet.

The lower limit of the *Glaciers* also bears witness to the exceptionally mild temperature of the Engadine. While, for example, the Grindelwald Glacier descends to 3140 feet, and the mean height of the lower end of fourteen glaciers on Mont Blanc is 4757 feet, the glaciers in the Engadine nowhere descend to within 6300 feet of the sea-level.

The winter covering of ***Snow*** lasts on an average five months and a half, namely from about the middle of November to the 1st May. (Ludwig.)

Winter in the Engadine is remarkable for its low temperatures (mean minimum of Sils —8.3° F., of Bevers —17.4° F.), and for the great number of clear, windless days, during which dark bodies are warmed to such an extent by the sun's rays that in spite of the low temperature of the air (winter mean at Sils 19.8° F., at Bevers 16.7° F.) the human body experiences a sensation of comfortable warmth in the sunshine, even without being thickly clothed, and it is extremely pleasant to be out-of-doors. During six months the lakes are constantly covered with a sheet of ice, which in the middle of winter becomes so thick that formerly the mail sledges and the heavy wine carts took their way across the Lake of Sils.

The least agreeable and salubrious periods in the Engadine are ***late autumn*** and ***early spring***, especially the latter, when the melting snow converts the roads for weeks together into bottomless sloughs, and all the organic substances that have passed through the winter in a frozen state begin to thaw. But the brief *summer*, into which is compressed the entire unfolding and development of the luxuriant organic life, presents very genial climatic conditions, and relatively high temperatures. In the shade it is seldom too cool, in the sunshine it is for the most part pleasantly warm without being oppressively hot; at the same time the mornings and evenings are agreeably fresh, and during the night the temperature falls still lower. But the warm summer weather is interrupted from time to time by short spells of cold, when warm clothing becomes indispensable, and it may even happen that a light fall of snow extending down to the bottom of the valley presents to the eye of the astonished visitor a winter landscape in mid summer.

* * *

In the following sections we intend to discuss the various factors which contribute to form the summer climate of the Engadine, and especially of St. Moritz, with which alone we are concerned here. In doing this we shall make use of figures derived from the meteorological records that have been kept in the observatory of the Kurhaus itself since 1856.

Only the records of the five years 1882—1886 are before me *in extenso*; but as the *means* derived from them differ but little if at all from the results of earlier observations, I have for the most part left the latter out of account, in order to be able to discuss at greater length the *details* of the observations. The other data, made use of for the sake of comparison, are mainly derived from the records of the Central Swiss Meteorological Institute.

I. Atmospheric Pressure

(reduced to 32° Fahr.)

A. Mean Height of Barometer

during the months June—September, calculated from the readings of the barometer at the Kurhaus St. Moritz (5803 feet) from 1882 to 1886:

24.25 inches.

B. Highest and Lowest Readings of the Barometer.

In inches.

	June		*July*		*August*		*September*	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1882	24.47	23.99	24.55	24.07	24.48	24.10	24.47	23.88
1883	24.49	23.93	24.49	24.17	24.52	24.16	24.45	23.82
1884	24.46	23.87	24.51	24.18	24.56	23.98	24.66	23.85
1885	24.52	24.16	24.54	24.16	24.45	23.98	24.62	23.87
1886	24.37	23.93	24.55	24.05	24.55	24.00	24.59	23.80

C. Greatest Daily Variations in the Barometer.

In inches.

	June	*July*	*August*	*September*
1882	.078	.122	.125	.133
1883	.098	.161	.905	.153
1884	.122	.094	.122	.149
1885	.094	.110	.082	.173
1886	.122	.129	.200	.129

At the Kurhaus St. Moritz the mean atmospheric pressure is thus 24.25 inches, or 97/120 of the pressure which the atmosphere exerts at the level of the sea, not only upon the column of mercury, but also upon the human body. Compared with Zurich the proportion is as 97 : 114, with Berlin and Paris as 97 : 119. What influence this rarity of the air has upon the functions of the body of one who has previously lived in a considerably denser atmosphere we shall see later on. One effect of the rarefied atmosphere is to increase the evaporation of water, which is facilitated, as is well known, by diminished atmospheric pressure. In the Engadine the boiling-point of water is as low as 187° Fahrenheit. A further result of the tenuity of the air is that its capacity for propagating sound-waves is decreased, so that noises are heard at a less distance than in the lowlands. This circumstance conduces in no small degree to the very beneficial quiet and stillness which prevail everywhere in our valley.

The daily fluctuations of the barometer are of no importance from a hygienic or therapeutic point of view; that they are relatively slight in St. Moritz is due to its situation and surroundings.

II. Temperature in the Shade.

Hours of observation: 7 A. M., 1 P. M., and 9 P. M.
Thermometer: Fahrenheit.

(a) Mean Temperature of the Season.

Calculated from the years 1872—1886:
49.96^0

(b) Mean Temperature of the Months.

Calculated from the years 1872—1886:

June	*July*	*August*	*September*
48.92^0	53.42^0	51.98^0	45.14^0

(c) Average Temperature of the Months.

	June	*July*	*August*	*September*
	0	0	0	0
1872	48.92	54.14	49.64	45.50
1873	49.28	55.76	53.42	44.42
1874	49.46	56.48	50.36	48.20
1875	51.26	51.80	53.24	47.12
1876	48.74	53.60	52.34	43.52
1877	54.86	51.80	54.86	42.80
1878	49.10	52.34	52.88	46.04
1879	49.64	49.28	54.68	46.58
1880	47.30	55.40	50.72	46.22
1881	48.20	56.84	53.06	42.80
1882	46.22	52.34	49.10	44.24
1883	48.74	51.44	50.54	44.24
1884	44.96	53.78	51.98	45.14
1885	52.16	54.68	51.26	44.60
1886	47.66	52.88	52.16	47.66

(d) Mean Temperatures at the Times of Observation

(1882—1886).

	7 A. M.				*1 P. M.*			
	June 0	July 0	August 0	September 0	June 0	July 0	August 0	September 0
1882	44.96	48.74	44.60	41.00	55.22	59.36	57.20	49.82
1883	48.74	47.84	44.06	39.56	55.40	59.00	60.44	50.72
1884	42.26	49.46	48.92	40.10	51.98	61.88	60.62	53.24
1885	48.20	50.36	48.74	39.20	60.62	63.14	59.72	53.24
1886	45.50	49.46	48.92	41.36	53.96	60.62	60.26	56.30
Mean	45.68	49.10	45.86	40.10	55.40	60.80	59.54	52.70

9 P. M.

	June 0	July 0	August 0	September 0
1882	38.48	48.56	45.86	42.26
1883	44.24	47.30	48.74	41.72
1884	41.00	48.02	48.38	42.26
1885	47.30	50.72	47.48	41.36
1886	43.52	48.92	48.92	45.32
Mean	43.88	49.10	47.48	42.62

(e) Extreme Temperatures at the Three Times of Observation

(1872—1886)

	June		*July*		*August*		*September*	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
	0	0	0	0	0	0	0	0
1872	65.30	36.50	77.90	41.00	64.40	36.50	67.64	21.56
1873	68.36	31.10	72.68	41.90	71.24	37.76	62.24	27.86
1874	68.72	32.54	74.30	40.28	67.28	37.58	66.20	34.16
1875	66.74	36.68	69.98	38.30	70.16	41.54	61.70	28.76
1876	64.76	33.98	68.54	39.20	69.08	35.06	61.16	28.40
1877	69.26	38.48	68.36	39.38	71.96	39.56	61.16	22.10
1878	63.86	34.88	71.60	37.76	67.28	41.54	63.68	28.94
1879	70.52	36.86	66.74	35.60	71.60	42.08	67.64	27.14
1880	63.50	34.16	71.96	41.18	64.76	38.66	64.04	26.60
1881	71.06	31.28	74.66	38.12	73.40	35.96	57.56	24.80
1882	66.92	30.74	69.08	40.46	64.94	36.32	64.76	30.56
1883	65.48	36.86	70.16	34.88	72.14	36.32	55.94	27.14
1884	64.40	30.56	73.04	38.12	68.72	36.32	62.06	28.76
1885	66.20	36.68	68.72	44.78	67.82	36.68	65.66	28.40
1886	62.96	35.60	74.12	35.60	70.16	39.56	66.20	31.64
Mean	66.38	34.52	71.42	39.02	68.90	38.12	62.78	27.86

(f) Average Daily Variations of Temperature.

	June	*July*	*August*	*September*
	0	0	0	0
1882	12.78	12.42	13.86	9.72
1883	11.70	12.42	17.10	12.60
1884	11.52	13.68	14.04	12.96
1885	14.04	13.86	14.22	16.02
1886	10.62	14.04	13.32	9.90
Mean	13.13	13.28	15.50	12.24

(g) Maximum and Minimum Daily Variations of Temperature.

	Maximum				*Minimum*			
	June	July	August	September	June	July	August	September
	0	0	0	0	0	0	0	0
1882	19.80	19.26	21.24	22.68	7.20	1.98	5.22	3.06
1883	17.28	20.16	27.36	21.06	2.88	2.16	2.16	3.06
1884	17.46	18.72	21.24	25.56	2.70	6.12	6.84	3.60
1885	19.80	20.52	21.06	30.60	11.52	4.14	4.32	4.50
1886	16.38	20.52	21.96	23.22	3.42	4.14	1.08	7.56

The *mean temperature of the season* (from the beginning of June to the end of September) in the last 15 years is thus 49.96° F., while according to an earlier calculation, for a period of ten years, it was 50.63° F.; but in this latter case the first 21 days of June and the last ten of September were not included, which sufficiently explains the difference. The mean temperature of the season at 7 A. M. is 45.14°, at 1 P. M. 55.02°, and at 9 P. M. 45.68°.

From the preceding tables it appears that *July* is the warmest month, the mean daily temperature being 53.42°. Its midday mean (60.80°) is only 1.26° higher than that of August, but a comparison of the morning temperatures shows a difference of 3.24°, and of the evening temperatures a difference of 1.98° in its favour. Again, the mean variation of the daily temperature (13.28°) is 0.12° less in July than in August, in which latter month the greatest daily variation recorded (27.36°) occurs. July also exhibits the highest temperature extremes, the mean of which for the 15 years is 71.42°. The highest temperature registered, 77.90°, was in July, 1872. The lowest temperature extremes of July never reach the freezing-point, their mean being 39.02°; the lowest July temperature, 34.88°, was recorded in 1883.

August, with a mean temperature for the month of 51.98° is only 1.62° behind its predecessor. The difference lies, as mentioned above, principally in the cooler morning (45.86°) and evening (47.48°) temperatures, which already bear an autumnal character. But even in August the thermometer never falls below freezing-point. The 15 years' mean of the minima is 38.12°; the lowest temperature, 35.06°, was registered in August, 1876, the highest, 73.40°, in August, 1883. The mean of the maxima is 68.90°.

June exhibits a mean temperature for the month of 48.92°. In the means of the different periods of the day it shows smaller differences than the other months (morning 45.68°, midday 55.40°, evening 43.88°). The mean variation of temperature during the day is also least during this month, viz. 13.13°. Its extremes range between 33.26° (1882) and 71.06° (1881), their means being respectively 34.61° and 66.38°. During the last four years the thermometer has only once fallen below the freezing-point in June.

September is the coolest month of the season, its mean temperature being 45.14°. This is chiefly owing to the low morning and evening temperatures (40.10° and 42.62°), for the midday temperature (52.70°) is only 2.70° below that of June. The average daily variation (12.24°) is almost as little as in the month of June. The means of the extremes are 27.86° and 62.78°, the highest being that of 1879, 67.64°, and the lowest that of 1877, 21.20°. In the last five years the thermometer fell below the freezing-point eleven times in this month; but it must be observed that the cold periods of September generally come near the end of the month, and those of June near its beginning, so that the "Season" is but little affected by them.

III. Solar Radiation.

In estimating the effect of the Alpine climate upon living beings, the intensity of the solar radiation forms one of the principal factors; not only in winter — although its importance is then increased — but also in summer. Its results are seen in the greater *heating effect*, greater *brilliancy of light*, and increased *chemical intensity*. The absorption of the solar rays in their passage through the earth's atmosphere augments with the density of the air, and still more with any increase in the amount of the aqueous vapour it contains. This absorption thus takes place principally in those strata of the air which lie below the altitude of St. Moritz.

It is much to be regretted that we have no exact observations bearing on the intensity of the sun's heat at St. Moritz during the summer. This is probably owing to the circumstance that the absolute methods of measurement are too difficult, while the relative methods hitherto adopted are subject to too many sources of error, from which not even the so-called black bulb thermometer *in vacuo* is free. I must therefore confine myself to citing a few data, derived from Hann's "Handbuch der Klimatologie", which prove that the solar heat increases with the altitude.

In respect to the *heating effect*, the "temperature in the sun," we are in possession of direct measurements made by Violle at different altitudes on Mont Blanc. These show that on the summit of Mont Blanc (15,781 feet) the heat radiated by the sun has lost only 6 per cent. of its original intensity, while at the sea-level the loss amounts to between 25 and 30 per cent.

silver paper, so-called heliographic paper, coated with pertartrate of iron and ferricyanide of potassium, was used. The photometers were exposed daily at both places from six in the morning till six in the evening, the resulting prints fixed by the same method, and the strips of paper dated and stored away. But as the two instruments were differently affected by the weather, the observations cannot be looked upon as accurate, and I abstain from publishing the result.

In lofty valleys the direct solar heat has also a powerful *reaction upon the temperature of the air.* The surface of the earth, warmed to a greater degree than the strata of air resting upon it, communicates its warmth to them, partly by conduction, partly by radiation. This source of atmospheric warmth is of far greater influence in lofty valleys than on isolated mountain-peaks of the same height, the constant motion of the atmosphere on the latter preventing any accumulation of the heated layers of air.

This explains why, for example, the mean temperature of the season at St. Moritz, at midday, is 7.56° higher than that of the Rigi-Kulm (at the same altitude), while the morning temperatures are the same, and as regards the evening temperatures the difference in favour of St. Moritz is only 0.54°. This important difference in the midday temperature is divided thus among the different months:

	St. Moritz	Rigi-Kulm
June … … … … …	55.40	46.58
July … … … … … …	60.80	52.34
August … … … … …	59.54	51.44
September … … …	52.70	48.02

But while the rare atmosphere of the mountains affords readier passage to the solar rays than the atmosphere of the plains, the *radiation of heat* from the earth during the night, bringing about a reduction in the temperature of the air and of the ground, is proportionately increased with the elevation. This is why the nights are always cooler in the mountains. And as the ground cools more rapidly and to a greater degree than the air above it, there is generally a heavy fall of dew in the Engadine, and in clear nights hoar frost often forms.

At like elevations the intensity of the solar rays at any given place depends upon its *exposure*—that is, its position in regard to the points of the compass—as well as upon the clearness of the sky (of which below).

In this respect St. Moritz and the whole of the Upper Engadine are very favourably situated. The two mountain-chains enclosing between them the lofty plateau have an average elevation of 9850 feet above the sea, and rise to a height of only 4000 feet above the valley on the side from which the sun shines. The loftier mountain summits, and especially the giant peaks of the Bernina group, stand in the second rank, and are therefore visible but to a very small extent from the main valley.

The subjoined table of altitudes, in which the names of the places and mountains are arranged about according to their geographical position, will make this clear.

Taking into consideration the broad conformation of the mountain-chain, the trough-like shape of the valley, its breadth, and the absence of precipices falling perpendicularly to it, especially on the side turned away from the sun, it becomes obvious that the entire valley must enjoy a long and thorough exposure to the solar rays.

The effect of this is felt in various ways. Owing to it the fresh air can be freely enjoyed in the Engadine on cool but clear days, and to it is also due the establishment of winter health-resorts among the mountains. To the power of the sunbeams we further owe the thorough warming of the soil, which alone renders it possible for a rich vegetation to thrive at such a height.

The *chemical and actinic effects* of the intense insolation at St. Moritz also make themselves apparent in many ways. Every visitor to our Alpine valley must have noticed the brilliant flood of light which the sun pours over the entire landscape, compelling persons with weak eyes to shield them from the glare by wearing blue spectacles. A further effect of the intensity of the light is seen in the much darker and brighter colours of the Alpine flowers as compared with those of the plains, and—in a less pleasing manner—in the fading of the colours in our garments.

(Heights above the Sea-level in Feet).

Ot	10659
Cima da Flix	10518
Pix d'Err	11820
Albula (Summit of Pass)	**7588**
Crestamora	9685
Padella	9465
Nair	10039
Albana	10170
Julier	11105
Suvretta	10085
Julier (Summit of Pass)	**6503**
Polaschin	9898
Ils Crutscharöls	9445
Lagrev	10400
Gravasalvas	9731
Lunghin	9120
Samaden	**5600**
St. Moritz (Baths)	**5803**
Maloja (Summit of Pass)	**5941**
Casaccia	**4612**
Muraigl	9783
Languard	10715
Albris	10387
Pontresina	**5931**
Muottas	7070
Rosatsch	9826
Surlei	10456
Corvatsch	11345
Mott'ota	8064
Margua	10354
Morteratsch	12316
Bernina	13294
Palü	12759
Crest'agüzza	12703
Zuppo	13120
Roseg	12884

IV. Relative Moisture of the Air.

Measured with the Hair Hygrometer.
(1882—1886).

(a) Monthly Averages of the Three Periods of Observation.

	June			*July*		
	7 A. M.	1 P. M.	9 P. M.	7 A. M.	1 P. M.	9 P. M.
	%	%	%	%	%	%
1882	?	?	?	76.3	52.0	82.5
1883	77.4	52.2	86.0	79.5	46.2	82.7
1884	75.7	45.8	78.8	83.6	46.2	85.3
1885	74.8	41.4	83.5	85.0	43.7	84.2
1886	82.7	51.4	90.2	84.9	44.4	87.8
Mean	77.6	47.7	84.6	81.8	46.5	84.5

	August			*September*		
1882	89.7	52.3	86.7	90.3	63.2	87.9
1883	84.3	42.1	81.8	92.3	55.6	88.8
1884	88.5	46.9	86.7	95.5	55.1	89.8
1885	94.2	49.6	89,1	94.5	59.3	95.3
1886	92.7	51.4	95.0	88.3	52.9	85.6
Mean	89.8	48.5	87.8	92,1	57.2	89.4

(b) Relative Minima of Moisture.

(1882—1886.)

	1882			1883			1884		
	7 A. M. %	1 P. M. %	9 P. M. %	7 A. M. %	1 P. M. %	9 P. M. %	7 A. M. %	1 P. M. %	9 P. M %
June … …	?	?	?	50	27	53	51	24	38
July … …	56	26	62	44	24	60	45	31	49
August …	56	34	49	52	19	52	33	25	35
September…	65	17	52	71	25	71	82	22	63

	1885			1886		
	7 A. M. %	1 P. M. %	9 P. M. %	7 A. M. %	1 P. M. %	9 P. M. %
June … … …	50	17	53	43	20	68
July … … …	57	17	46	60	21	39
August … …	74	22	72	60	26	88
September …	52	17	52	32	28	40

(c) Number of Days showing less than 50 % Relative Moisture.

	June			*July*		
	7 A. M.	1 P. M.	9 P. M.	7 A. M.	1 P. M.	9 P. M.
1882	?	?	?	0	13	0
1883	0	16	0	0	22	0
1884	1	21	4	1	23	2
1885	0	22	0	0	23	1
1886	2	13	0	0	21	2
Mean	0.75	18	1	0.2	20.4	1

	August			*September*		
1882	0	16	0	0	5	0
1883	0	24	0	0	10	0
1884	1	20	2	0	12	0
1885	0	16	0	0	12	0
1886	0	15	0	1	12	0
Mean	0.2	18.2	0.4	0.2	10.2	0

d Number of Days showing 100 $^0/_0$ Relative Moisture.

	June			*July*		
	7 A. M.	1 P. M.	9 P. M.	7 A. M.	1 P. M.	9 P. M.
1882	?	?	?	1	0	1
1883	1	0	1	0	0	1
1884	0	0	0	1	0	2
1885	0	0	4	5	0	4
1886	0	1	7	1	0	1
Mean	0.25	0.25	3	1.6	0	1.8

	August			*September*		
1882	3	0	2	3	0	4
1883	0	0	1	4	1	4
1884	1	0	1	9	1	5
1885	0	0	5	15	1	17
1886	3	0	1	14	0	2
Mean	3.2	6	2	9	0.6	6.4

(e) Comparison of the Monthly Means of Relative Moisture at St. Moritz, Zurich, and Rigi-Kulm.

	7 A. M.			*1 P. M.*		
	St. Moritz %	Zurich %	Rigi %	St. Moritz %	Zurich %	Rigi %
June	77.6	86.8	81.9	47.7	64.9	81.7
July	81.8	88.5	77.2	46.5	64.3	77.2
August	89.8	90.7	81.1	48.5	67.0	78.0
September...	92.1	95.0	78.3	57.2	74.0	74.3
Season	85.3	90.2	79.7	49.9	67.5	77.8

	9 P. M.		
	St. Moritz %	Zurich %	Rigi %
June	84.6	84.5	85.8
July	84.5	83.7	81.9
August	87.8	84.5	82.8
September...	89.4	91.0	81.1
Season	86.5	85.9	82.9

(f) Comparison of the Number of Days with less than 50 % Relative Moisture at St. Moritz, Zurich, and Rigi-Kulm.

June to September inclusive.

	7 A. M.			*1 P. M.*			*9 P. M.*		
	St. Moritz	**Zurich**	**Rigi**	**St. Moritz**	**Zurich**	**Rigi**	**St. Moritz**	**Zurich**	**Rigi**
1882	0	0	3	34	2	5	0	0	0
1883	0	0	5	72	5	3	0	0	2
1884	3	0	5	76	16	2	8	0	1
1885	0	0	10	73	21	6	1	0	2
1886	3	0	10	61	9	10	2	0	8
	6	0	33	316	53	26	11	0	13

(g) Comparison of the Number of Days with 100 % Relative Moisture at St. Moritz, Zurich, and Rigi-Kulm.

June to September inclusive.

	7 A. M.			*1 P. M.*			*9 P. M.*		
	St. Moritz	**Zurich**	**Rigi**	**St. Moritz**	**Zurich**	**Rigi**	**St. Moritz**	**Zurich**	**Rigi**
1882*	7	0	20	0	0	10	7	0	30
1883	4	13	12	1	0	10	6	7	17
1884	12	17	37	1	1	24	9	1	31
1885	29	17	8	1	1	9	30	10	11
1886	18	3	13	1	0	9	11	0	10
	70	50	90	4	2	62	63	18	99

* For 1882 the June observations are not included, as they are wanting for St. Moritz.

R. M.
100%
90%
80%
70%
60%
50%
40%
30%

R. M.
100%
90%
80%
70%
60%

calculation from the three hours
high percentages of moisture at
difference at Berne is a trifling
sky, 0.5 $^0/_0$ with a cloudy sky),
the error is an important one
$^0/_0$ on cloudy days).

that the daily mean of the relative
quoted, is not the true standard
mountain climate, but that the
must always be considered apart.
mountain climate with a lowland
is to take the midday observations,
those of the morning and evening
seen from Table *e*.

and *d* it appears that the month
of the season, having 46.5 $^0/_0$ as
the relative moisture was 21.6
complete saturation was recorded
comes *June*, with 47.7 $^0/_0$ as its
moisture under 50 $^0/_0$ 19.7 times
3.2 times. *August* differs but
preceding months, showing 48.5 $^0/_0$
50 $^0/_0$ 18.8 times, and complete
The moistest month of the four is
being as follows: midday mean
10.3 times, complete saturation 16

of the climate of St. Moritz becomes
e, *f*, and *g*, in which the relative
is compared with that at Zurich

height (Rigi-Kulm, 5872 feet) and at a place in the lowlands with a moderately damp climate (Zurich, 1542 feet).

If we compare the hourly variation of the relative moisture in the Engadine with that in the lowlands, an important difference will become apparent. As hourly observations at St. Moritz are wanting, we have borrowed from Ludwig's work "Das Oberengadin" the preceding table, showing the hourly variations of the hygrometer at Pontresina and Berne. A glance at this table will show that in the Engadine the curves fall much more rapidly than at Berne, or in other words that the degree of moisture reaches the midday minimum much earlier in the forenoon in the Engadine than at Berne. We see from this that the calculation of the mean of the three usual hours of observation must vary from the truth (the calculation from the *hourly* observations) much more in the Engadine than at Berne.

For instance, on the cloudless day September 18th the relative moisture amounted to:

	At Berne.	**At Pontresina.**
Calculated from the 3 hours of observation	71.6 %	63.8 %
Calculated from the hourly records	67.6 %	50.8 %
Difference	4.0 %	13.0 %

And on the overclouded day September 22nd:

Calculated from the 3 hours of observation	87.0 %	82.0 %
Calculated from the hourly records	86.5 %	76.5 %
Difference	0.5 %	5.5 %

According to this, the calculation from the three hours of observation yields too high percentages of moisture at both places, but while the difference at Berne is a trifling one (4 °/o with a clear sky, 0.5 °/o with a cloudy sky), as regards the Engadine the error is an important one (13 °/o on cloudless, 5.5 °/o on cloudy days).

It follows from this that the daily mean of the relative moisture, which is usually quoted, is not the true standard by which to judge of a mountain climate, but that the three periods of observation must always be considered apart.

In comparing a mountain climate with a lowland climate the simplest way is to take the midday observations, as the difference between those of the morning and evening is but slight, as will be seen from Table *e*.

From Tables *a*, *c*, and *d* it appears that the month of *July* is the driest of the season, having 46.5 °/o as its midday mean, while the relative moisture was 21.6 times under 50 °/o, and complete saturation was recorded only 3.4 times. Next comes *June*, with 47.7 °/o as its midday mean, relative moisture under 50 °/o 19.7 times and complete saturation 3.2 times. *August* differs but little from the two preceding months, showing 48.5 °/o midday mean, under 50 °/o 18.8 times, and complete saturation 3.4 times. The moistest month of the four is *September*, its record being as follows: midday mean 57.2 °/o, under 50 °/o 10.3 times, complete saturation 16 times.

The great dryness of the climate of St. Moritz becomes evident from the Tables *e*, *f*, and *g*, in which the relative moisture at St. Moritz is compared with that at Zurich

(1542 feet) and the Rigi-Kulm (5872 feet). While the morning and evening means differ but little at the three stations, the more important *midday* mean at St. Moritz is 49.9 %, relative moisture under 50 % 333 times, complete saturation 137 times. At Zurich the midday mean is 67.5 %, relative moisture under 50 % 63 times, complete saturation 70 times. On the Rigi-Kulm the mean midday moisture is 77.8 %, under 50 % 79 times, complete saturation 251 times.

This last comparison proves that the elevation above the sea affords absolutely no criterion by which to judge of the relative moisture, and that in this respect also the climate of St. Moritz maintains its continental character as compared with an isolated mountain-peak of the same altitude, which is exposed to the moist ocean winds, while the currents of air passing over the Engadine have in great part condensed their watery vapour on the outer walls of the lofty plateau.

It is to this comparative freedom from aqueous vapour that the atmosphere of the Upper Engadine owes its great clearness and transparency. Everything, even the farthest ridge, appears sharply defined in light and shade, and at great distances we can distinguish details which elsewhere would be indistinct. This leads to frequent mistakes in estimating distances. The landscape is also deprived of its picturesque atmospheric effects, the blue haze of the distance and the "Alpine glow",—appearances due to the refraction of the light in the moister atmospheric strata.

V. Direction of the Wind.

(a) Number of Observations in Different Months of the Season. 1882—1886.

	E	SE	S	SW	W	NW	N	NE	No Wind
				7 A. M.					
June	16	—	5	19	6	—	4	92	8
July	19	—	2	21	6	—	—	99	9
August	25	—	5	19	6	—	1	82	17
September	27	—	5	41	8	—	2	36	28
	87	—	17	100	26	—	7	309	62
				1 P. M.					
June	13	—	5	84	12	—	1	35	—
July	7	—	8	90	5	—	3	41	1
August	4	—	15	101	4	—	2	27	2
September	4	—	11	97	14	—	1	20	3
	28	—	39	372	35	—	7	123	6
				9 P. M.					
June	8	—	2	47	3	—	—	30	60
July	—	—	6	48	1	—	1	38	61
August	—	—	4	49	2	—	—	17	82
September	—	—	9	36	4	—	1	18	82
	8	—	21	180	10	—	2	103	285

(b) Total Observations at Different Times of Day, 1882—1886.

	E	SE	S	SW	W	NW	N	NE	No Wind
7 A. M.	87	—	17	100	26	—	7	309	62
1 P. M.	28	—	39	372	35	—	7	123	6
9 P. M.	8	—	21	180	10	1	2	103	285
	123	—	77	652	71	1	16	535	353

The two foregoing tables give information as to the *direction* of the prevailing winds. As regards the *force* of the wind, no observations have hitherto been made. South-east and north-west winds are excluded by the configuration of the valley, and for the same reason north and south winds are rare. In the Engadine the latter seldom assumes during summer the character of the "Föhn"—a violent south wind common in other parts of Switzerland.

The prevailing winds of the Upper Engadine blow in the direction of the valley, the *south-west* being most frequently recorded—652 times in a total of 1828. In fine, warm weather it makes its appearance every day at noon with great punctuality, and often blows with unpleasant violence; in the beginning of the summer it lasts till towards four o'clock, and later on till towards five, when it gives place to a complete calm or to a light breeze from the north-east. During these hours it is a sign of fine, warm weather, and is indeed the "valley wind" proper of the Upper Engadine, being due to local conditions. But if it blows earlier or later than the above-named hours, it is caused by an oceanic air-current, and as a rule brings rain.

The origin of this Upper Engadine valley wind (S.W.), which, contrary to the general rule, blows *down* the valley, is thus explained by Billwiller in Vol. XV. of the Austrian Meteorological Journal:

The hot rays of the sun warm the air on the lateral slopes, which are free from snow in summer, and consequently it begins to ascend. This produces at the bottom of the valley a rarefied space calling for a compensating current. The valley of the Inn being extremely long and having but a slight slope, this current cannot ascend from below—that is, from the mouth of the valley—and if the Engadine were bounded by lofty mountains at its upper end, as it is in its whole length, a descending current of air would necessarily be felt over the middle of the valley. But in reality the upper end is open, and from the Maloja Pass (5941 feet) the valley falls abruptly, and at first almost perpendicularly, to the Val Bregaglia and towards Chiavenna.

But as a brisk ascending current is developed along the southern base of the Alps, and is felt especially in the steep upper part of the Val Bregaglia, nothing is more likely than that the rarefaction of the air in the valley of the Upper Engadine is compensated for by ***aspiration of the cooler and somewhat denser air beyond, but in the same level as, the Maloja.***

This "aspiration theory" also explains why the movement of the wind is only perceptible at the very bottom of the valley, while 150 or 200 feet above it there is absolutely no wind.

The *north-east* wind is the next in frequency, having been recorded 535 times out of 1828—309 times in the morning. It is the morning wind *par excellence*, is often scarcely perceptible, and seldom exceeds the limits of an agreeable breeze.

Calms often prevail during the evening in fine weather (recorded 258 times), while at midday they are extremely rare (6 times), and are also far from being frequent in the morning (62 times during five summers).

On the whole it may be said that that only the periodic valley wind is felt at St. Moritz. Although it sometimes blows with too great force, so as to compel sensitive persons to postpone their afternoon walk till a late hour. This regular wind movement exercises a beneficial influence in two ways. In the first place it augments in a high degree the evaporative power of the climate, which is dependent not only upon the relative moisture and the *density* of the air, but also upon the *motion* of the air. Secondly it effects the frequent renewal of the atmosphere round and in the dwellings more thoroughly than any artificial system of ventilation, and this, in a place where large numbers of people are congregated in a comparatively narrow area, is an advantage not to be underrated.

VI. Overclouding and Rainfall.

(a) Observations in the Years 1882—1886.

June	Cloudless	Clear	Somewhat Cloudy	Over-clouded	Rain	Fog	Snow
7 A. M.	10	48	7	70	11	1	3
1 P. M.	3	42	13	75	13	—	4
9 P. M.	9	36	5	82	18	—	—
	22	126	25	227	42	1	7
July							
7 A. M.	23	67	8	42	13	2	—
1 P. M.	9	59	22	51	14	—	—
9 P. M.	14	53	9	60	18	—	1
	46	179	39	153	45	2	1
August							
7 A. M.	14	67	9	49	25	5	—
1 P. M.	5	70	9	60	11	—	—
9 P. M.	25	66	7	40	17	—	—
	44	203	25	149	53	5	—
September							
7 A. M.	11	32	4	52	24	19	8
1 P. M.	13	55	8	50	21	—	3
9 P. M.	18	50	5	57	18	1	1
	42	137	17	159	63	20	12

(b) Daily Average of the Weather through the Summer Months.

(For the five years 1882—1886).

	Cloudless	Clear	Somewhat Cloudy	Over-clouded	Rain	Fog	Snow
June	1.46	8.40	1.66	15.13	2.80	0.06	0.46
July	3.06	11.93	2.60	10.20	3.00	0.13	0.06
August	2.93	13.53	1.66	9.93	3.53	0.33	—
September	2.80	9.13	1.13	10.60	4.20	1.33	0.80
	10.25	42.99	7.05	45.86	13.53	1.85	1.32

The records with regard to *overclouding* and *rainfall* at St. Moritz were not made according to the scale of overclouding (1—10) adopted in the Swiss Meteorological Stations, and the *amount* of rainfall has not been recorded at all. The above table only enables us, therefore, to form a comparison between the different months, not to compare the climate of St. Moritz with that of other places.

Table *a* shows that of 20 *falls of snow* recorded in the course of five summers, none occurred in August, 1 in July, 7 in June, and 12 in September. *Fog* was recorded once in June, twice in July, 5 times in August, and 19 times in September. It invariably shows itself in the early morning hours, is a sure sign of fine weather, and vanishes on the appearance of the sun.

If we count the first three columns as fine days, we find that the average for June is 11.5, July 17.5, August 18.1, and September 13.0. The finest weather thus comes towards the close of the season, and is less frequent in September,—contrary to the old tradition that among the high mountains September is the finest month. In respect to the number of days on which rain falls, July has the most favourable showing: 3.06; then follows June with 3.26, August with 3.53, and September with 5.0 rainy days.

From observations extending over 13 years (1860—1873) Husemann has calculated the daily average of overclouding and rainfall for the entire season, and his figures taken together with the above give the following result:

	Clear	Clouded	Fog	Rain	Snow	Thunder
1860—73	63.9	28.1	10.8	21.4	1.57	7.6
1883—86	60.2	45.8	1.85	13.5	1.8	1.3

The number of clear days is about the same for both periods, but there is a considerable difference as regards the number of rainy days and days with foggy mornings.

In order to make a comparison with other places, as must be done before any conclusions can be drawn, the means of the observations at Sils-Maria and Bevers were taken; the figures thus obtained are probably not far from correct, as St. Moritz lies geographically midway between those two places.

The following averages were thus obtained for the season at St. Moritz, as compared with the same period at Zurich and the Rigi-Kulm during the last four years:

	Average Overclouding	Rainfall in cub. c.	Quite clear Days	Rainy Days
St. Moritz	5.6	43.9	26	41
Zurich	5.5	53.0	19	48
Rigi-Kulm	6.1	100.4	25	51

It thus appears that the clearness of the sky during summer at St. Moritz is but little less than in the lowlands, while it exceeds in a marked degree that of an isolated mountain-peak of the same elevation.

In respect to the number of quite clear days, St. Moritz occupies the first place. Exact information on this point can be obtained, however, only by the employment of an automatic sunshine register such as is now used at various places in the Swiss lowlands and at Da

The greatest differences appear in the
rainfall, which is more than 100 per
Rigi than at the same elevation in

is explained again by the peculiarities in the topographical configuration of the two places. While the Rigi, projecting into the lowlands, is greatly exposed to the moist oceanic air-currents, which ascend along its sides, and, being thus cooled, part with some of their moisture, in the Rhætian Alps this condensation takes place on the exterior sides of the lofty plateau on which the Engadine lies, and by the time the air has reached the interior of the valley it has already lost most of its moisture. This explains why the Engadine has, next to Canton Valais, the least rainfall of any district in Switzerland. (See Billwiller's Rain-Map of Switzerland, in the Swiss Meteorological Annals for 1883.

A comparison of the amount of rainfall at the different places in the valley of the Inn shows most clearly the absorbent effect of the massive mountain-plateau, and the increase of the rainfall on approaching the lowlands.

According to Hann's "Handbuch der Klimatologie" the average rainfall in cubic centimètres at the different places in the valley of the Inn is as follows:

Rosenheim	Innsbruck	Landeck	Remüs	Zernetz	Bevers	Sils	Castasegna
138	87	57	57	59	79	95	145

The middle valley of the Inn, between Landeck and Zernetz, is thus among the driest districts in all the Alpine regions.

VII. Evaporation.

In the preceding sections it has been mentioned that the atmospheric pressure, the relative moisture, and the winds are all factors influencing the amount of evaporation, which increases with the decrease in the atmospheric pressure and relative moisture, and with the increase in the motion of the air and temperature.

As all these conditions, except the last, make themselves felt in a higher degree at St. Moritz than in most of the other health-resorts known to us, it is clear that the climate of the Upper Engadine must be characterized by remarkable "evaporative power."

As far as the author is aware, no comparative measurements of the evaporation have yet been made in the Engadine and in the lowlands simultaneously. If carried out under exactly similar conditions, they would certainly yield the results that are to be expected, in spite of the discrepant observations of Brieger and Volland at Strasburg and Davos.

Common observation of the facts of daily life is sufficient to convince us of the high evaporative power of the Engadine air. No one fails to notice how remarkably quickly the roads become dry even after the heaviest downpours of rain, and how very difficult it is to keep them free from dust after long continued fine weather. Grass mown in the early morning after a heavy dew is fit for carrying in the evening, while at the same time it may have to lie for several days in the lowlands. Attentive observers will also notice how quickly the water in flower-vases is reduced in amount, how soon inkstands become dry, etc.

Then again, the possibility of preserving meat in lofty mountain districts by simply drying it in the air depends in part on the great evaporative power of the atmosphere, as well as on its freedom from putrefactive organisms, though the latter point, to which we shall return, is probably the most important.

As regards the influence of the Alpine climate on the human system, the high evaporative power doubtless plays a very important rôle. Of this we shall have more to say later on. Here we will only mention one matter of general observation, which has often been misinterpreted, but which is in reality to be ascribed to the desiccative effect of the climate. We often hear it said that in the Upper Engadine the perspiration is diminished, or even entirely suppressed. This is an error. It is probable that, *ceteris paribus*, quite as much perspiration is *produced* in the Upper Engadine as in the lowlands, or even *more*, but as soon as it appears on the surface of the skin it is *absorbed by the dry air*, before it has made its presence felt by rendering the underlinen moist. It thus gives rise less frequently to colds.

VIII. Purity of the Air.

As in the Upper Engadine, with the exception of the dust on the unwatered roads, all the conditions are absent which in other places render the air chemically or physically impure, such as constant fires developing large quantities of smoke, manufactories, etc.; and as further the decay of organic substances is considerably retarded even in summer by the above-mentioned factors, while the periodic valley wind constantly brings about the renewal of the air, no one will dispute the fact that the atmosphere of St. Moritz is favourably distinguished from that of the lowlands by its *greater purity*.

As a matter of fact, this great purity of the air is noticed at once by every visitor arriving from the lowlands; to use an expression often heard, "it makes breathing a pleasure."

No investigations have yet been made in regard to the micro-organisms contained in the air in the Upper Engadine. Experiments of this nature would be of the greatest value in enabling us to judge of the salubrity of the climate, and it will probably not be long before something is done in this direction, now that serviceable methods have been discovered.

From the scanty investigations so far made, it is evident that the air of lofty mountain regions contains fewer microbes than that of the plains. As long ago as 1862 it was proved by Pasteur that the air on the Mer de Glace is free from the germs that produce fermentation, which are present in large numbers lower down, in the atmosphere of the village of Chamounix.

In the summer of 1883 Freudenreich examined samples of air from the Strahlegg Pass, between the Grindelwald and Aare Glaciers (10,500 feet), from the foot of the Eiger (6890 feet), and from the Schilthorn (9750 feet). Altogether 94.5 cubic feet of air were examined, by Miquel's method, and not a single bacterium or mildew fungus was found.

Such was the result in uninhabited glacier districts. In the following summer samples of air were taken from mountain districts in closer proximity to human habitations. On the Aletsch Glacier (9850 feet) there were found in 70 cubic feet of air two bacteria, a mildew fungus, and a torula. On the St. Theodule Pass (10,960 feet) 106 cubic feet of air contained a single bacterium, and on the summit of the Niesen (7762 feet) 35 cubic feet contained six or seven bacteria, while in 35 cubic feet of air in the city of Berne they were to be found by hundreds and thousands.

To infer, from the rarity of micro-organisms in the mountain air examined by Freudenreich, their equal rarity in more thickly populated districts, like the Upper Engadine, would be inadmissible, but it certainly appears probable that the air of lofty valleys is freer from microbes than that of the plains.

Investigations of this kind will not have any real value, however, until our knowledge of pathogenetic organisms enables us to distinguish them from such as are innocuous.

To judge from our medical experiences, the ***summer*** climate of the Engadine is unfavourable to pathogenetic organisms, since cases of acute infectious diseases occasionally imported by chance from elsewhere invariably remain isolated, while at other seasons of the year, especially in spring and autumn, these diseases may become epidemic even in our Alpine valleys.

IX. Electricity and Ozone.

Concerning the electrical conditions of the atmosphere, especially in relation to their influence upon the human system, the necessary scientific data are wanting. It seems certain, however, from the investigations of De Saussure on Mont Blanc, and from those of Becquerel and Breschet on the Little St. Bernard, that the ***electrical tension*** of the atmosphere is greater on the mountains than in the plains, and that it increases with the elevation above the sea. We may therefore assume that the quantity of electricity present in the Engadine air is relatively considerable, and that it influences our nervous system constantly. Possibly it is a much more important factor in the mountain climate than has hitherto been supposed. Our knowledge of the subject is still too slight to enable us to in any way *define* its influence.

Fluctuations in the tension of the atmospheric electricity, such as occur previous to a thunderstorm, sometimes make their influence upon the human system felt at St. Moritz in a remarkable manner, a large number of excitable individuals experiencing similar disagreeable sensations and feelings of uneasiness, which disappear all at once upon the outbreak of the storm.

Our knowledge of the *ozone* contained in the air, and of its effect upon the system, rests upon no more secure a basis. The very methods of investigation are so uncertain that their results are often contradictory, and no theories regarding the influence of ozone and its therapeutic value have yet risen above the level of mere suppositions.

In general it is assumed that violent commotion in the air promotes the development of ozone, and Messrs. Townsend and Greathead, who, according to H. Weber, made observations at St. Moritz in the years 1869—71, found that the air always contained a very large amount of ozone, which is in accordance with the general assumption.

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2. The Springs.

AT present there are two chalybeate springs in use at St. Moritz, the *Alte Quelle*, which yields the most water, and which was formerly the only one employed for medical purposes, and the *Neue* or *Paracelsus Quelle*, which has been used only during the last forty years. The former is employed chiefly for the baths, while the water of theParacelsus Quelle is used internally and is also bottled for exportation.

In 1886 President Gartmann, of St. Moritz, discovered a *third* spring, said to be not inferior in volume and in the quality of its water to either of the others. This spring, which rises in the meadow between the Badstrasse and the slope of the Rosatsch, and not far from the latter, is evidently identical with the so-called Maria Huoter Quelle, several endeavours to "tube" which had previously been made (for the last time in 1864), but always without success, as the spring could be followed back only into the gravel. We can give no details regarding the volume of water, composition, etc., of this new spring, but there is no doubt that it will prove a valuable addition to the resources of St. Moritz.

Not far from the place where the Inn enters the lake, bubbles of carbonic acid gas rise to the surface in a continous stream, rendering it probable that a *fourth* spring rises here at the bottom of the lake.

The geological formation of the district in which all these springs are found, at but short distances apart, is described as follows by Professor Husemann, who analysed the water of St. Moritz in 1873.

Piz Rosatsch, a mountain rising immediately above the establishments of the health-resort, and containing the secret laboratory in which these waters are mineralized, is principally composed of syenite and syenitic diorite, alternating with masses of gneiss. The rocky wall from which the New Spring, or Paracelsus Quelle, issues, consists for the most part of granite similar to that found on the Julier Pass, but while higher up hornblende occurs, the transition into fine-grained syenitic diorite takes place at no great elevation; but side by side with it we also find coarse-grained specimens of the same stone, as well as quartzitic syenite and true granite, passing the one into the other without sharply defined boundaries. The summit of the mountain is composed entirely of syenitic diorite.

While there is no doubt whatever that the New Spring rises directly from the fine-grained granite, it is a question whether the Old Spring issues from the same formation; when this spring was newly tubed in 1853, the lower part of the old tubing, being in very good condition, was not disturbed, and therefore it was not ascertained whether the huge hollow tree-stem of which it consists actually rests upon the rock from which the spring rises, or whether it is only imbedded in the gravel above the rock. It therefore remains an open question—though it is one which has an important bearing on the discovery of new springs—whether the mineral springs found here all rise directly from

[illegible]

[illegible]

[illegible]

[illegible] springs is [illegible] Pyrmont. The water of the Old Spring is perfectly clear, but the New Spring contains a not inconsiderable [illegible] of iron, [illegible] is so exceedingly fine [illegible] when the water is allowed to stand, [illegible] precipitated in delicate reddish flakes. Both the waters [illegible] in the glass, and even after standing a considerable time gas bubbles are evolved, the half-free carbonic acid being but slowly liberated. The water is quite inodorous, and has an agreeable and refreshing taste, the astringent flavour of the iron being almost completely concealed by the pungency of the carbonic acid.

A cast-iron pumping apparatus conveys the water of the Paracelsus Quelle into the Trinkhalle, adjoining which is a spacious covered promenade.

Patients drink the waters at different hours of the day,— in the morning on an empty stomach, in the afternoon, in the evening, and at meal-times,— but most of the visitors come to the spring between 10 and 12 in the forenoon. As a rule the quantity drunk in one day does not exceed four small glasses of 180 grammes (rather less than one-third of a pint) each. In many cases it is desirable to warm the water, and there is a special apparatus for this purpose in the Trinkhalle. Whether this is to be done or not, how much water is to be drunk, whether milk, whey, or anything else is to be added to it,—all these matters must be left for the doctor to decide in each individual case, it being impossible to lay down general rules on the subject.

Chemical Composition of the Old and New Springs (Alte Quelle and Neue or Paracelsus Quelle).

According to an analysis by Prof. Husemann, 1873—1874.

(a) The Carbonates calculated as Monocarbonates.

Constituents	*In 1000 grammes Water*	
	Alte Quelle	*Neue Quelle*
Lithium Chloride	0.000848	0.000885
Sodium Chloride...	0.043764	0.034683
Sodium Bromide...	0 000536	0.000099
Sodium Iodide	0.000013	0.0000024
Sodium Fluoride...	0.000630	0.001740
Nitrate of Soda	0.000333	0.000721
Borate of Soda	0.003614	0.005228
Sulphate of Soda	0.307415	0.321101
Sulphate of Potash	0 014382	0.014800
Monacarbonate of Soda	0.192465	0.128273
Monocarbonate of Oxide of Ammonium	0.002008	0.001750
Monocarbonate of Lime...	0.852025	0.904132
Monocarbonate of Strontia	0.000088	0.000092
Monocarbonate of Magnesia...	0.129345	0.132686
Protocarbonate of Manganese	0.003829	0.004043
Protocarbonate of Iron	0.023996	0.028020
Hydrated Peroxide of Iron	—	0.006108
Silicic Acid	0.040169	0.053445
Phosphoric Acid...	0.000156	0.000144
Alumina	0.000050	0.000030
Baryta, Cæsium, Arsenic, Copper, Organic Matters	Traces	Traces
Total Solid Constituents	1.615666	1.637982
Obtained directly	1 576600	1.614200
Free and Half-free Carbonic Acid:	*c. c.*	*c. c.*
(*a*) At 32⁰ F. and bar. 30 in....	1500.906	1553.160
(*b*) At natural temperature and bar. 24¹/₄ in.	1891.606	1956.505
Free Carbonic Acid:		
(*a*) At 32⁰ and bar. 30 in.	1230.010	1282.810
(*b*) At natural temperature and bar. 24¹/₄ in.	1550.190	1615.630

(b) The Carbonates calculated as Bicarbonates.

Bicarbonates	*In 1000 Grammes Water*	
	Alte Quelle	*Neue Quelle*
Bicarbonate of Soda...	0 272356	0.181518
» Oxide of Ammonium	0.002928	0.002552
» Lime	1.226916	1.301950
» Strontia	0.000114	0.000119
» Magnesia	0.197097	0.202188
» Protoxide of Manganese ...	0.005292	0.005588
» Protoxide of Iron	0.033098	0.038648

3. The Baths and Douches.

MINERAL-water baths can only be taken in the ground floor of the Old Kurhaus. It contains eighty bath-rooms (wainscotted with the wood of the cembra-pine), comfortably fitted up, and well ventilated and warmed. There are covered passages connecting all the rooms in the Kurhaus with the bath-rooms.

Some of the wooden bath-tubs, which were formerly the only kind used, but were not universally approved of, have now been replaced by metal baths.

A steam-pump raises the mineral water of the Old Spring into two large reservoirs, from which it finds its way through a system of pipes into the bath-tubs. There is also a supply of cold water laid on, for cleaning the tubs after every bath.

The baths are heated by Pfriem's system: a tub having been filled with water, free steam is injected into it. A few minutes suffice to raise the water to the required temperature. In this way but comparatively little carbonic acid gas is lost. According to Husemann the mineral water in the spring contains 3.049 per cent. carbonic acid, in the reservoirs 2.087 per cent., and in a bath heated to 65.6° Fahr. 0.096 per cent., which is equal to 53/100ths of the quantity present in the reservoir and 39/100ths of the original quantity.

The baths are taken between 7 in the morning and 6 in the evening. In the majority of cases treated at St. Moritz cool baths of short duration are indicated—68 to 77 deg. Fahr. during 10 to 20 minutes. The reaction after the bath is generally sought to be produced by bodily exercise rather than by the warmth of the bed.

The douche apparatus with which the bath-rooms were provided until a few years ago were not up to the modern standard of hydropathic appliances, and accordingly in 1884 the Kurhaus Management had a special building erected behind the Baths, containing a large ***Douche-Room***, which leaves nothing to be desired in point of elegance, completeness, and suitability for its purpose. It is built of wood, in a pleasing style of architecture, and is connected with the Kurhaus by a covered passage lighted from the top; the douche-room as well as the dressing-rooms adjoining can be heated by steam, and the temperature is easily regulated to the required degree; in cool weather this is an advantage which it would be difficult to overrate.

All the douche apparatus are of polished brass, made and set up by the well-known firm of Henny Frères, Geneva. The necessary water is supplied from a large reservoir on the mountain-slope behind the building, under a pressure of not quite two atmospheres; the water is heated by injected steam.

In the principal room, into which all the dressing-rooms open, there are the following douches:

1. Cold Douches.
2. Warm Douches.
3. Scotch Douches.
4. Circular Douches.

All these are provided with the necessary modifications and combinations. The adjoining rooms contain hip-baths, various local douches, and a vapour bath. The attendants, both male and female, who supply the douches, are well trained, and are skilled in the operation of massage. They also attend patients in their rooms, if required.

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III.

EFFECTS OF THE CURATIVE AGENTS, AND INDICATIONS.

1. The Effect of the Climate.

THIS is not the place to determine in what manner the conditions of health and mortality of the *resident* population of the Engadine are influenced by the climate; a few hints on the subject were given in the first chapter. Just as little need we discuss the question, what effect the Alpine climate may have upon invalids — consumptive patients—passing several months here during the *winter*. In these cases due weight must be allowed to various important factors which need not be taken into account when the summer climate alone is under consideration. All that concerns us here is the effect of the Alpine climate upon persons who, accustomed to live in the lowlands, pass several weeks at St. Moritz in the *summer-time*, and afterwards return to their ordinary place of abode.

For a number of years it has been my self-chosen task to study experimentally the influence of the climate of the Engadine upon the functions and the change of tissue in the last-mentioned class. The subjects of my experiments and observations have been, first, my own person, secondly, a number of healthy people making periodical sojourns at St. Moritz, whom I have had an opportunity of examining previously, and in part also subsequently, in the lowlands (at Zurich).

I cannot here enter upon the details of the complicated and tedious methods of investigation pursued, nor can I give the results obtained in a tabular form; I must content myself with making a general statement of the chief of them, and bringing them into accord with observations made by myself and others both on invalids and on persons in the enjoyment of complete health.

In considering the influence of the mountain climate upon inhabitants of the plains staying for a limited time at St. Moritz, three periods fairly well marked off from each other both in their objective and subjective expression may be discriminated:

1. The period of acclimatisation.
2. The period following acclimatisation.
3. The period succeeding the visit to St. Moritz.

I. The Period of Acclimatisation.

This period lasts from four to twelve days,—as a rule from six to eight. It makes itself felt in a more or less severe degree by subjective sensations in the case of perhaps one-third of the total number of visitors; in the remaining cases it passes unnoticed. This period is distinguished by various functional disturbances.

The turgor of the *skin* increases, even in the parts covered by the clothes. In the exposed parts, especially in persons of fair complexion and such as remain long exposed to the sun, a lively reddening, accompanied by a burning and smarting sensation, sets in, and may pass into an erythematous inflammation. The latter may, however, always be avoided by the use of broadbrimmed hats, veils, sunshades, etc., and by rubbing the exposed skin-surface with ointment, or dusting powder thereon. A slight reddening of the *conjunctiva* is also occasionally observed, but this soon disappears in any case, and may be entirely obviated by protecting the eyes against wind and intense light.

A very common symptom is the ***diminished need of sleep***, which may even pass into insomnia. Persons of nervous and excitable temperament are the most exposed to this influence; in many cases it gives rise to unquiet dreams; children often cry out in their sleep. Most of the subjects complain of waking very early in the morning, few of having had difficulty in going to sleep; but all feel thoroughly rested in the morning, and quite free from the unpleasant sensations that otherwise usually follow a bad night's rest. Among my patients was a gentleman who, according to his own trustworthy statement, never had a wink of sleep during the first six nights, but was nevertheless quite well and lively, and able to enjoy himself throughout the day. It is seldom, however, that sleeplessness reaches this degree of intensity; in most cases a dose of potassium bromide procures the patient a good night's rest, and often a glass of beer suffices.

Almost as frequent symptoms are ***palpitation of the heart and difficult breathing***, not so much when in a state of rest as on the occasion of the slightest bodily exertion. Individuals ordinarily subject to these complaints, whether in consequence of disturbances of circulation and respiration or of pronounced anæmia, are specially liable to be attacked. But sometimes quite healthy and robust persons are affected, and the difficulty of breathing may come on during the night and increase to asthma-like paroxysms, causing the greatest anxiety to the sufferer, but of course disappearing again in a very short time without any evil consequences.

Disturbances of digestion are less frequent. The appetite seldom falls off,—on the contrary, it generally increases from the first day; but a certain amount of *constipation* often occurs.

Giddiness, severe head-ache, and bleeding at the nose are very rarely complained of; more frequently we hear of a sense of *pressure in the head* and *singing in the ears.* On the other hand, slight psychic alterations are often observed, manifested for the most part in a remarkable lightheartedness and buoyancy of spirits, but sometimes also in an unusual tendency to shed tears.

This period is characterized objectively by an increase in the *frequency of respiration*, especially during the first few days. In the morning, when quite quiet in bed, the *pulse* is rarely quicker than usual, but in the evening under the same conditions its speed is almost always accelerated, and during bodily exertions the number of the heart's contractions and of the inspirations increases much more rapidly than under like circumstances in the lowlands. The *pressure of the blood*, measured with Bach's sphygmometer, is in most cases *diminished.*

As regards the *excretions of the body* during this period, we have to note the following:

The *diuresis* increases considerably in the first two or three days, but afterwards falls below the normal amount.

The quantity of ***urea*** excreted is at first considerably less than usual, but gradually increases till it reaches the average quantity.

In the excretion of ***uric acid*** there is no modification of importance to be noted.

The amount of ***air*** expired is sensibly increased, as is also the absolute and still more the relative quantity of *carbonic acid* given off from the lungs. The amount of *aqueous vapour* contained in the expired air is also increased.

II. The Period following Acclimatisation.

Its commencement falls, as a rule, in the beginning of the second week.

The turgor of the ***skin*** and the plethora of its capillaries continue in a slight degree. In cases of erythematous inflammation an exfoliation and new formation of the epidermis takes place. Meanwhile the exposed parts have undergone ***tanning*** to a considerable extent through the increased deposit of pigment in the cells of the rete mucosum. The secretion of the sebaceous glands is often diminished; the hair then becomes dry and crisp, inducing many persons to use pomade who have not been in the habit of doing so.

At the commencement of the second week the formation of ***herpetic pustules*** at the place where the skin passes into the mucous membrane of the lips and nose is often observed, but in the course of a few days these pustules dry up and fall off.

At times this herpetic eruption occurs on the palate and tonsils, giving rise to a sore throat characterized by innocuous white spots and a slight increase in temperature; as a rule these symptoms disappear in three or four days.

The *sleep* again becomes normal, both in quantity and quality, and many even sleep better than usual; in other cases the sleep remains unusually light during the entire visit, but is none the less refreshing. Sleeplessness lasting longer than the first week may render a removal to a less lofty region necessary.

The *difficulty of breathing* and *palpitation of the heart* disappear, except when due to serious defects, and give place to an unusual lightness of respiration, even under moderate exertions.

In almost all cases a permanent *increase* takes place in the *amount of food required*, but the thirst is never increased in any important degree. The functions of the intestines are again performed with regularity, though in exceptional cases the dyspeptic symptoms persist, yielding only to a change of air.

Giddiness, *headache*, and *sense of oppression in the head* disappear, where they have been felt; the feelings, which were at first somewhat excited, quiet down and give way to a placid and equable state of mind; but in neurasthenic patients a certain unquietness may continue during the entire visit, and disappear only after their return to the lowlands. The *capacity for undergoing bodily fatigue* is sensibly increased, and it is said that many also find mental work easier than usual. The high altitude seems to exercise, if anything, a repressive effect on the sexual functions, but its influence in this direction never outlasts the visit.

The objective changes in this period are as follows: the *respirations* gradually return to their normal number, or remain at the most from one-half to one respiration per minute above it. The frequency of the pulse is likewise gradually reduced to the usual number, and neither the pulse nor the respirations are accelerated by exertion as much as in the beginning of the visit. The *pressure of the blood*, on the other hand, is *increased*, and so remains, contrary to what we found to be the case during the period of acclimatisation.

The *secretion of urine* varies within the usual limits, as does also the excretion of *urea* and *uric acid*. It does not appear, therefore, that there is any increase in the amount of nitrogenous waste products excreted by the kidneys. On the other hand the quantity of *air* expired, and the amount of *carbonic acid* and *aqueous vapour* contained in it, remain during the entire visit above the normal quantity. That the volume of air expired remains greater, although the frequency of respiration again becomes normal, is a proof that *the single inspirations are increased in depth.*

III. The Period following the Visit to St. Moritz.

The *tanning of the skin* disappears in the course of a week or two, and sometimes a renewed desquamation of the epidermis takes place.

The *frequency of the pulse* and of *respiration* falls at first below the ordinary limits, but reaches them again after one or two weeks. We have had but few opportunities of measuring the blood-pressure in this stage, and these yielded contradictory results, so that no definite conclusion could be drawn from them.

The capacity for bodily exertion, the general feeling of health, and the energy of the vital functions remain permanently increased, if not counteracted by prejudicial influences such as excessive heat, mental over-exertion, etc.

* * *

Combining the chief of the above-stated points bearing on the effect of the climate, with a view of duly apportioning the result among the different climatic factors, we may safely enough take the following as proved:

1. There is an increased flow of blood to the skin, the upper layers of which become irritable; the former is probably a consequence of the diminished pressure of the air, the latter an effect of the extreme dryness of the air and intensity of the sun's rays.

2. The exchange of gases in the lungs is promoted, —not only in the beginning, while the number of respirations is greater, but also when they have sunk to their normal number and when, therefore, the increase still maintained in the volume of expired air can be explained only by the greater depth of the inspirations.

We cannot ascribe this fact to a purely mechanical cause, namely to the tenuity of the air, because the atmosphere of the Upper Engadine contains an abundance of oxygen for the purpose of respiration, and there can be no question here of an *oxygen starvation*, such as

Jourdanet has described among the inhabitants of the elevated plateaux of Mexico; therefore we may perhaps attribute this increased energy of respiration to a stimulation of the respiratory centre, whether owing to a change in the composition of the blood, or by reflex action consequent upon the greater activity of the skin.

This increased energy of respiration must in any case involve a ***better ventilation of the lungs*** on the one hand, and the ***greater activity of the respiratory muscles*** on the other hand. Whether it can bring about a better development of the thorax—as long as that remains capable of development—and a strengthening of the elastic fibres of the pulmonary tissue, as many maintain, we do not know. The former is probable, but has not yet been proved.

3. The pressure of the blood in the vessels, although at first diminished, is in the end permanently increased. There must accordingly be an *increase in the energy of the heart's contractions and dilatations.* Whether this should be referred solely to a mechanical cause—inspissation of the blood, or diminution of its volume, through more water being given off, resulting in facilitated systole—or to a change in the innervation of the heart, we cannot pretend to decide.

The initial diminution of the pressure of the blood seems to indicate that the insomnia of the first period is due to the resulting passive hyperæmia of the brain.

4. In regard to *fluid* and *gaseous excretions,* it has already been remarked that an increase of the nitrogenous waste products, especially of the urea in the urine, does

not occur,—at first the secretion of urea is actually diminished,—nor is there any reduction in the amount of the products of incomplete oxidation, especially of uric acid.

On the other hand the quantity of carbonic acid and water given off by the lungs is permanently increased, and probably the same is the case as regards the skin. In order to decide this latter point, and to ascertain with certainty the total exchange of gases, it would be necessary to experiment both in the lowlands and at St. Moritz with a Pettenkofer apparatus.

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What then are the conclusions to be drawn from these results as regards the influence of the mountain climate upon the process of tissue-change? Does it, as is commonly maintained, facilitate tissue-change? This question is as important as it is difficult to answer.

It may be assumed with tolerable certainty from the increased excretion of carbonic acid and water, that there is a more rapid combustion of fat, and that more water is withdrawn from the tissues. That under ordinary circumstances the extra consumption of substance is not covered by an increase of the incomings, but that on the contrary there is a call upon the store of fat and the water in the tissues, is evident from the reduction (or very trifling increase) which commonly takes place in the weight of the body, —a point to which we shall again refer.

But what about the consumption of albumin? As said above, the nitrogenous waste products in the urine are *not* increased, and we are therefore not justified in assuming that there is any increase in the consumption of albuminous substances. Whether such an increase takes place through these substances being split up into their final constituents, or into nitrogen, carbonic acid, and water, and expired with the air from the lungs, cannot be positively decided; it is, however, not very probable.

It thus appears that in the mountains the physiological balance of the human body constantly presents the same conditions during rest as it does in the plains during exertion. But although this continuous extra exertion of the vital functions goes on in the mountains, we are not sensible of it, it being mainly concentrated in those groups of muscles which control the movements of the apparatus of circulation and respiration. That under these circumstances there must take place a formation of organic albumin, and an increase and strengthening of the muscular fibres involved, corresponds to an unquestioned physiological law.

Important evidence in support of this view is furnished by the manner in which the weight of the body is influenced by the mountain climate.

In the summer of 1886 I weighed with the greatest possible exactness not only many of my patients, but also all the Kurhaus employés, the guides, porters, etc., both at the commencement and at the close of their stay at St. Moritz.

The number of persons of the last class weighed was 81, and with few exceptions they enjoyed normal health.

During the summer they were well and plentifully nourished, most of them no doubt better than in winter. Their occupations called in part for severe bodily exertions (washerwomen, porters, guides, etc.), in part for lighter exertions (waiters, cooks, chambermaids, etc.).

Of these 81 persons, 25 showed an average loss of weight of 2 lb. 10 oz., 56 an average increase of 4lb. $6^1/_2$ oz. It was remarked that those who had to perform the greatest amount of bodily labour (guides and porters) almost without exception increased in weight, while those who had lost weight were principally people whose occupation called for no great amount of bodily exertion (chambermaids, waiters, etc.).

Although this result seems at first sight to be inconsistent with what has been said above, and with the views commonly held as to the consumption of substance, the contradiction is only apparent. The employés engaged in the latter kinds of work (chambermaids, cooks, and waiters) usually arrive at St. Moritz with a considerable store of fat, which is burnt under the influence of the mountain air, so that they decrease in weight. But Alpine guides, as travellers well know, are mostly lean, compactly built individuals, who at the first glance scarcely appear capable of undergoing extraordinary fatigue, and the same holds good of the porters. All of these people bring with them very little fat, or none at all, to be burned; on the other hand the substance of their muscles is enlarged by the continued severe exertions, more flesh is deposited, and an increase in weight is the result. What takes place in all cases in regard to the muscles of the heart and thorax extends itself in their case to other extensive groups of muscles.

Of the visitors 226 were weighed, not including such as underwent treatment for obesity through the use of saline waters, etc. Of this number 104 showed an average gain of 2 lb. 8 oz., and 122 an average loss of 2 lb. 4 oz.

But in view of the unusual amount of nourishment taken by most of the visitors, in consequence of their increased appetite and the plentiful supply of food, the slight increase in bodily weight in some cases, and the actual loss of weight in others, are out of all proportion to the other results of the treatment. The cause of this also lies in the greater amount of water given off, and in the more rapid combustion of the food taken, as well as of the fat stored up in the body. Invalids with but a thin cushion of fat need not, however, hesitate for this reason to try a course of treatment at St. Moritz, if other indications render it advisable. That in such cases the improvement in health is demonstrated by a corresponding increase in weight after the return home, is not a mere empty consolation offered to the departing visitor, but is a fact repeatedly verified by experience. It is, however, no less true, that invalids who have been treated for obesity at St. Moritz will soon lose the benefit of the treatment after their return to the lowlands, unless they make up their minds to follow systematically, and for a sufficiently long period, suitable hygienic rules.

* * *

2. The Effect of the Waters taken Internally.

WHEN the water, which is of an extremely pleasant and refreshing taste, is imbibed in moderate quantities, it produces a sensation of warmth in the stomach, increases the appetite, and causes a plentiful diuresis. On the evacuations of the intestines it has, when taken in small doses, a regulating or temporarily retarding effect. The fæces are as a rule coloured dark by the sulphide of iron formed in them.

Excessive doses produce a feeling of oppression in the stomach, which either disappears after a few eructations or is followed by dyspepsia, headache, and constipation.

The judicious use of the waters for a sufficiently long period brings about an improvement in the composition of the blood, in all those cases which have no serious constitutional disorders. The principal signs of this improvement are a brighter colouring of the integument, an access of bodily and mental vigour, and increased energy of all the vital functions.

Full-blooded persons cannot, as a rule, drink the water without suffering from palpitation of the heart, congestive headache, and giddiness.

Taking the latest analysis of the St. Moritz springs by Professor Husemann, and leaving out of account all those mineral substances, which, according to the present state of medical knowledge, are present in too small a quantity to produce a pharmaco-dynamic effect upon the human system, we find the amount of active constituents in a litre (= 1.76 pints) of water, to be approximately as follows (Carbonates calculated as Bicarbonates):

	Alte Quelle	Neue Quelle
	Grains	Grains
Bicarbonate of Protoxide of Iron	0.46	0.61
Bicarbonate of Soda	4.63	3.08
Bicarbonate of Lime	18.51	20.06
Bicarbonate of Magnesia	3.08	3.08
Sulphate of Soda	4.63	4.63
Carbonic Acid, free and half-free	1891 c. c. =6.67 cub. ft.	1956 c. c. =6.90 cub. ft.

Of these substances the *iron* and the *carbonic acid* are of chief therapeutic value. They characterize the St. Moritz springs as *"simple chalybeates."* The carbonates and sulphates of the alkalies are present in too small quantities to impart a special character to the water; they are accordingly of secondary importance, and can at the most be of service as antacids in cases where there is an excessive formation of acid in the stomach.

As regards the amount of iron they contain, the springs of St. Moritz hold a position about midway between their rivals, but in abundance of carbonic acid they are equalled by few and excelled by none.

The *carbonic acid*, besides being of very great value in the baths, also plays an important part when the waters are used internally. It occasions the agreeable pungent sensation felt while the water is passing the palate, and it masks the unpleasant astringent taste of the iron. But it is in the stomach that the carbonic acid produces its chief effect, by operating as a fairly intense though transient stimulant of the mucous membrane and the gastric nerves. It excites the secretion of gastric juice, thus assisting digestion and increasing the appetite. To its action on the terminations of the gastric nerves is attributable the soothing effect produced in gastralgia, etc., by the drinking of aerated liquids.

Part of the carbonic acid being liberated only in the stomach, it causes an expansion of that organ, giving rise, when the muscular coat is intact, to a vigorous peristalsis. But where the muscular fibres have degenerated, as in pronounced dilatation of the stomach, this peristaltic reaction is not set up, and then the distension of the stomach produces most distressing sensations; in this case, therefore, all waters containing carbonic acid, including those of St. Moritz, are contraindicated.

From the stomach a portion of the carbonic acid is evacuated by eructation; another portion passes into the intestines, where it produces the same stimulating effect upon the mucous membrane and muscular coat as in the stomach; a third small portion is taken up into the blood and eliminated by the lungs. In this way the carbonic acid exercises a passing but unmistakable effect upon the central nervous system, making itself felt, when the water is taken in moderate quantities, in a general feeling of exhilaration, but resulting, if excessive doses are taken, in vertigo—the so-called "spa intoxication."

To its great richness in carbonic acid the water of St. Moritz owes its marked influence upon the *diuresis*. Soon after drinking the water a copious discharge of urine takes place. According to Quinke's researches, this diuretic effect depends not upon the stimulation of the centres of the renal excretion by the carbonic acid absorbed into the blood, but entirely upon the circumstance that water rich in carbonic acid is absorbed by the stomach very much faster than water deficient in that gas; this produces an increase of the pressure in the renal arteries, resulting in a more abundant excretion of urine.

The carbonic acid in the St. Moritz water is thus an agreeable gustatory corrective (maintaining at the same time the protoxide of iron in solution), a powerful diuretic, and above all a stimulant promoting the digestion and assimilation not only of the food, but also of the iron taken into the stomach with the water.

The therapeutic value of *iron* was recognised long before the part it played in the economy of the human body had been ascertained. At the present time it is well known that iron forms an integral part of the red blood-corpuscles, being an essential constituent of their hæmoglobin. The hæmoglobin has the important rôle assigned to it of being the carrier of oxygen and the medium of the exchange of gases in the tissues. In the lungs it absorbs oxygen and forms oxyhæmoglobin, a loose compound which parts with its oxygen in the tissues, to obtain a fresh supply in the pulmonary circulation. That hæmoglobin is capable of playing this important part is probably due entirely to the presence of iron, which is changed from a protoxide into an oxide and *vice versa.* (Hayem).

We are also well informed as to the quantity of iron actually contained in normal blood; it amounts to 0.057 per cent. of the weight of the blood; in a man weighing eleven stone this would be equal to 47.37 grains (Hayem). According to Boussingault the amount of iron daily consumed in food is between 1.23 and 1.38 grains, and according to Fleitmann a like amount is excreted in the fæces during the same space of time.

Divergent views long prevailed regarding the chemistry of the *absorption* of iron. Physiologists are now pretty generally of opinion that the iron is oxydised in the stomach (the hydrogen thus liberated causing the eructation which follows the taking of iron into the stomach), where it unites with the hydrochloric acid to form a protochloride of iron. In this form a small portion is taken up directly from the stomach into the blood, with the albuminates and alkaline bases of which it forms a soluble double compound. The larger part of the iron is converted before it leaves the stomach and intestines into such a double albuminate or peptonate, and is thence taken up by the blood as a finished soluble product.

The mesenteric veins seem to be the principal channels of *absorption* for the iron, while the liver appears to form a kind of depot for it, from which it is taken up into the general circulation.

Iron is *eliminated* from the body in all the secretions and excretions. The perspiration, the saliva, the juices of the stomach, pancreas, and intestines, and the urine, all contain a small quantity of iron. But the greater part of it is passed out through the liver, whose secretion, the bile, is rich in ferruginous colouring matters. It is possible that a *surplus* of iron does not find its way at all into the greater circulation, but is at once excreted from the liver into the intestines (Pagamizzi, Lussana). Be this as it may, we find the principal part of the excreted iron in the fæces, together with that which has been supplied in excess and never assimilated.

We are therefore fairly well informed in respect to the high physiological importance of iron for the human body, and to the way in which it enters and leaves the system, and we also know that in anæmic subjects there is a deficiency of hæmoglobin, and consequently of iron, in the blood. In severe cases of chlorosis, for example, it is reduced to a half, and even to a quarter, of the normal quantity, so that instead of 46 grains being present, there are not more than from 23 to 11. Nothing seems more natural than that we should endeavour to supply this deficiency by administering iron in the form of a medicine. But we are met by the fact that the food daily consumed itself contains sufficient iron to supply the deficiency, and that many cases of chlorosis are cured, when the external conditions are favourable, without the administration of iron, while other cases are influenced but little if at all by long-continued treatment with iron in large doses. Nevertheless there is no disputing the fact, proved by the experience of opinion, that in the majority of cases anæmia and chlorosis are alleviated or cured by treatment with iron, and few physicians would fail to prescribe it for these complaints, provided that the stomach will tolerate iron at all. Any explanation of the effect of the iron must for the moment be hypothetical. It is probable that in chlorosis the ferruginous medicaments, when they are able to operate, promote in the first place the evolution of blood-corpuscles which would otherwise have remained in rudimentary forms, and that in the second place the surplus iron is made use of by the blood-corpuscles as a source from which to supply themselves with the necessary quantity of hæmoglobin.

Certain it is that treatment with iron will continue to hold its own, although we may remain in doubt as to the manner in which its beneficial effects are produced, and although of late years other medicaments (as, for instance, arsenic) have been tried with more or less success in some of the maladies in which iron is indicated.

What then are the advantages possessed by natural chalybeate waters, like those of St. Moritz, over the artificial preparations of iron now to be found in the market, sometimes in very convenient forms? The answer becomes obvious when we state the conditions indispensable to the successful operation of a ferruginous remedy: first, it must agree with the stomach; secondly, it must be easy of assimilation.

That the first of these conditions is fulfilled by the St. Moritz water is chiefly owing to the circumstance that the carbonic acid so plentifully ingested with the iron excites the stomach and intestines to great activity, at the same time that it renders the mineral water extremely pleasant to the palate. In but few instances, however, is the low temperature of the water of advantage in promoting its digestion; most patients find it agree with them better when it is warmed.

The second condition—that the iron be assimilated in a sufficient quantity to be operative—is fulfilled by the water of St. Moritz neither through its "fortunate combination with alkaline salts," nor through the chemical formula under which the iron is present, nor through its amount. As stated above, the carbonates and sulphates of the alkalies are present in too small quantities to exercise any effect worth mentioning upon the composition of the blood and its power of assimilation. Then too the theory, upon which much stress was formerly laid, that protocarbonate of iron found in solution in mineral waters is immediately absorbed as such, cannot be maintained in the light of the explanations given above. (The old prohibition of acid articles of diet—e. g. salads—loses all its significance for the same reasons, and must now be confined to tannic acid, which forms with iron an insoluble compound.) Nor can the *quantity* of the iron be cited in favour of the natural chalybeates, now that analysis has proved beyond contradiction that the amount of iron taken into the stomach even with the strongest of these waters is far less than the ordinary pharmaceutical doses.

Why is it, then, that the iron contained in the St. Moritz water is more fully assimilated and produces more beneficial results than that supplied by the apothecary? How are we to account for the fact that cases of chlorosis and anæmia [illegible] treatment with iron, [illegible] in a comparatively short time at St. Moritz? The answer is that the [illegible] lies not in the water alone, but in the external hygienic conditions accompanying its use.

At home the treatment with iron plays but a subordinate part, and is slipped in as it were into the programme of daily life between the labours of business and irregularities and amusements of society, many a bitter pill of household worry being gulped down at the same time. But at the health-resort the patient, if he is sensible and under right guidance, attends exclusively to his health—the treatment he is undergoing becomes the main point for him, and all his doings are regulated accordingly, his entire mode of life being changed to suit it. Then there is the influence of the baths, of the change of diet, of the freedom from work and worry, and above all the effect of a climate totally different from that to which the patient has been accustomed.

Since this last factor is so extremely prominent at St. Moritz, and is capable, as shown above, of giving such a powerful impulse to all the vital functions, it is easy to understand that the human body is more readily rendered capable here than elsewhere of assimilating what it lacks, and making good its deficiencies in iron from what is presented to it.

In these accompanying circumstances lie the value and importance of a course of treatment at St. Moritz. To the fact that here the effects of the climate aid those of the mineral water more thoroughly than is perhaps the case in any other health-resort, the admirable results attained at St. Moritz, and its worldwide reputation, are owing. This reputation it will retain as long as anæmic patients exist, and as long as mankind persists in pursuing a mode of life utterly at variance with that prescribed by a rational hygiene.

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3. The Effect of the Baths.

As already remarked, the cases coming for treatment to St. Moritz demand almost without exception baths of cool temperature and short duration, which, at first of about 90° Fahr., are towards the end of the treatment brought to a temperature of [illegible]° Fahr. The prescription of prolonged warm baths, which are sometimes necessary for the quieting of accidentally occurring states of excitation, requires special precaution at St. Moritz, in view of the frequently low temperature of the air and the consequent possibility of the patient's taking cold.

On first entering the bath the cool mineral water produces a sensation of cold, and the skin loses colour in consequence of the contraction of its blood-vessels. But soon the surface of the body is covered with countless little bubbles of carbonic acid, and is more or less reddened by the expansion of the capillaries of the skin. A sharp prickling sensation now makes itself felt over the entire surface of the body, increasing sometimes to a slight burning sensation in the mucous membranes under water. In spite of the low temperature of the water, the feeling of cold soon gives way to a comfortable sensation of warmth, which continues after leaving the bath, if the patient has not remained in it too long, and if sufficient corporal exercise be taken to produce the proper reaction. This is accompanied by a feeling of bodily and mental freshness and increased vigour, often lasting throughout the day.

The effect of the baths of St. Moritz upon the human body and its functions is twofold,—*thermic* and *chemical.* The thermic effect is identical with that of an ordinary cool fresh-water bath of like temperature. The changes which a cold bath produces in the economy of the human body are fully explained in Liebermeister's epoch-making work. The loss of heat which the body suffers in the cool bath occasions an increased production of heat, that is to say, an increased combustion of fat, which outlasts the bath. As a consequence of this there is an increased production and excretion of carbonic acid, while no change takes place in the amount of the nitrogenous waste products.

The chemical effect of the baths of St. Moritz is to be attributed exclusively to the abundance of carbonic acid in the water. This gas operates in the first place as an intense cutaneous irritant, producing a strong flow of blood into all the capillaries of the skin, at a time when in a cold fresh-water bath they would still be in a contracted state. It is probably owing to this cutaneous hyperæmia, that in a bath rich in carbonic acid the sensation of cold so soon gives place to the subjective feeling of warmth, permitting us *to lower the temperature to a degree that would not be tolerated if ordinary water were used.* In this, according to my view, lies the chief value of baths containing carbonic acid.

But the carbonic acid of the bath has an effect not only on the cutaneous vessels, but also upon the cutaneous nerves. The much discussed question, whether the salts dissolved in the bath-water are absorbed into the system through the skin, was long since decided in the negative. No one, therefore, will now imagine that he can impregnate his system with iron by bathing in the St. Moritz waters. On the other hand it has been proved by experiment that in the bath the skin is permeable to *gaseous* substances. Though this is the case only to a limited extent as regards carbonic acid—since absorption can take place only so long as the pressure of the carbonic acid in the blood and in the juices of the tissues is less than in the bath-water—so much at least is certain:—the carbonic acid of the bath exercises an intense stimulation upon the terminations of the cutaneous nerves, and this makes itself felt reflexly in other nervous tracts in ways which, though various and difficult to define, are still unmistakable. For the present we must content ourselves with knowing that this cutaneous irritation is able to exercise a regulative influence upon functional disturbances of distant nerve centres and nerve paths, leaving the exact ascertainment of these alternative relations to later investigations, to which the recent discoveries in metallo-therapeutics and hypnotism may perhaps point the way.

The effect of the *douches* and other hydropathic processes, such as are often employed during a course of treatment at St. Moritz, can only be briefly referred to here, since a thorough discussion of them would lead us too far from our immediate subject. The douches owe their efficacy chiefly to their thermal and mechanical effect, which latter is increased by various manipulations, such as rubbing, massage, etc. These too have as their object the drawing of the blood towards the skin, thereby affording healthful relief to the internal congested organs. Various contrivances enable us to concentrate this influence on different parts of the body, thus affording in some cases an efficacious local support to the general treatment.

By way of resumé we may class the effect of the tepid St. Moritz baths under the following heads:

1. A brief but energetic deprivation of heat, resulting in increased production of heat and increased change of substance in the mode described above.

2. A copious flow of blood to the skin, relieving the congestion of the internal organs.

3. Excitation and regulation of the entire nervous system, by reflex action, starting from the terminations of the cutaneous nerves.

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4. General Indications and Contraindications.

WHEN, in describing the curative agents, we placed the climate first, this was because we regarded its influence as the most powerful. It makes itself felt day and night, unobtrusively but continuously, with every breath, while the use of the waters, internally and externally, is optional and of but temporary influence. While the climate makes greater calls upon the functions — increasing the combustion of fat and elimination of water, deepening the respiration, and calling for greater energy in the heart's contractions — it renders them capable, in accordance with a physiological law, of performing this increased amount of work by promoting the assimilation of nutritive substances, facilitating the secretion of the juices, and strengthening the respiratory and cardiac muscles. Returning to the home climate with an apparatus adapted for more severe exertions, it is then an easy matter for the system to perform the diminished labour required of it. This theory, at least, accounts for the *permanent effect* of a course of treatment in the mountains, — an effect outlasting the patient's stay among them, and felt in many cases only after his return home.

Not that we would underestimate the value of the internal and external use of the mineral waters. Where an improvement in the composition of the blood is desirable, the waters may be advantageously employed internally, and where it is necessary to regulate the activity of the nervous system, the baths and the douches are no less useful.

Without danger of exaggeration we may say that the various curative agents of St. Moritz, employed together and complementing each other, exercise an *invigorating* effect upon the enfeebled system, to a degree scarcely equalled in any other health-resort. St. Moritz is *par excellence a tonic.*

Our health-resort, therefore, is suited above all for those who, by too constant application to business, by the fatiguing social pleasures of the winter season, or by the bustle and restless activity of city life, have been reduced to a state of general relaxation which is neither health nor sickness, but which may easily develop into the latter unless the system is withdrawn, at least for a time, from the prejudicial influences to which it has been exposed.

Again, in the malady so prevalent in these days that it seems to be characteristic of the modern era, the tonic influence of St. Moritz is invaluable. Everyone will assent to this, who, behind the scenes of this mundane theatre, in the physician's consulting-room, has had an opportunity of becoming acquainted with the ceaseless mental struggle for existence necessitated by the circumstances of the present day, and who knows the injurious reaction of the fatigues of social life and of our modern methods of education and training upon the physical welfare of those who are subjected to them. Anæmia and neurasthenia are the pathological symptoms stamped upon the educated classes nowadays, and at the springs of St. Moritz these complaints crowd all others into the background.

But in recommending St. Moritz as a sanatorium for the weakly and debilitated *in general*, some exceptions must be made, in view of the peculiar character and intensity of the factors coming into play.

Invalids whose system is no longer able to respond, by a salutary reaction, to the energetic impulse given it by the climatic influence, will only aggravate their malady at St. Moritz. The principal cases of this class are cachectics suffering from malign tumors, leucocythæmia, advanced tuberculosis accompanied with fever, and marasmus senilis. Even in very severe cases of chlorosis, in which there is an insufficient production of heat, the effect of the climate may be prejudicial, and at any rate a long stay at an intermediate station will be indispensable.

Erethistic and irritable constitutions suffer under the process of acclimatisation for a shorter or longer period,—sometimes throughout their stay,—but nevertheless the treatment may have good results, provided it was actually indicated. But in convulsive and spastic conditions, epilepsy, chorea, convulsive hysteria, etc., St. Moritz is generally too stimulating, as it is also for persons liable to paroxysms of mental excitement.

In torpid lymphatic constitutions the favourable effect of the climate and waters is visible from the very beginning;

acclimatisation takes place unconsciously, and there is constant if slow improvement. Such cases are therefore well suited for treatment at our health-resort.

As regards the *ages* in which a visit to St. Moritz is likely to be beneficial, the old opinion still commonly prevails, that the climate of the Engadine is unsuited to children and old people. But I have noticed so many exceptions to this rule, and have so seldom seen it confirmed, that I attach very little importance to it. To bring very young children to St. Moritz is often unadvisable from practical considerations connected with their care, but where this matter can be satisfactorily arranged, nothing else need stand in the way. Older children without exception thrive admirably at St. Moritz—if not sent out walking with bare legs, or allowed to overeat themselves at the table d'hôte. As for old people, I know some with atheromatous arteries, who insist upon coming to St. Moritz every summer to strengthen themselves against the winter. Entirely decrepit senile conditions are of course excluded, as are also cases in which there is an insufficient development of heat and great sensitiveness to changes in temperature.

The climacteric age demands greater precaution. Women of plethoric habit, with tendency to congestions and menorrhagia, with hæmorrhoids, chronic inflammation of the uterus, etc., approaching this age, should not come to St. Moritz. On the other hand, those with hydræmic blood and incipient disturbances of circulation due to excessive fat deposit, may regard our health-resort as affording a panacea for their disorders. But caution and moderation in the employment of the remedies, avoidance of all unnecessary fatigue, and preparation for the lofty mountain climate by a sojourn at an intermediate station, are indispensable conditions of successful treatment.

Pregnancy is usually regarded as an absolute contraindication for St. Moritz. But during six years I have had opportunity of observing nineteen pregnant women undergoing treatment here, and have only seen one case of abortion, and this was due to accidental exterior circumstances (mountain climbing). Therefore this general rule decidedly needs qualifying. I would not send women with tendency to abortion to St. Moritz, nor, as a matter of precaution, first pregnancies,—more on account of the long journey than of the treatment itself. But where former pregnancies have invariably reached a normal termination, there is no reason why the case should not be sent to St. Moritz if this health-resort be otherwise indicated.

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And here we may offer a few general remarks concerning the utility and necessity of *intermediate stations* before and after a course of treatment at St. Moritz. As already stated more than once, in the first period after the visitor's arrival in this lofty valley various disagreeable symptoms show themselves, namely excitement of the nervous system and disturbances in the respiration and circulation. Though not in themselves dangerous, they are apt to frighten nervous people, interfere with the subjective feeling of health, and postpone the beginning of the beneficial influence of the treatment.

But experience has shown that when the climatic contrasts between the lowlands and the Upper Engadine are rendered less abrupt by the visitor's staying a few days at a place at half the altitude of St. Moritz, so as to become gradually accustomed to the change, the disorders attending acclimatisation are less severe or entirely absent. This climatic preparation is to be recommended especially to persons of an easily excited, nervous temperament or with defects in the apparatus of circulation or respiration.

A stay at an intermediate station *previous to* the course of treatment is therefore especially advisable in the case of nervous women, children, and neurasthenic patients, and further in the case of invalids suffering from affections of the heart, tendency to hæmorrhage, emphysema, and asthma.

After the treatment the circumstances are different, because a return to the lowlands affords relief to the system by diminishing the amount of labour it is called upon to perform. From this point of view, therefore, there would be nothing in the way of the patient's going straight home, were it not to be feared that the sudden transition from the cool temperature of the Engadine to the summer heat of the lowlands might have a relaxing effect upon the system. For this reason it is advisable that all who leave St. Moritz during the summer months should break their journey by staying for a few days at some suitable place, especially if the daily fatigues of business or the household await them at home.

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5. Special Indications.

I. General Anomalies of Nutrition.

(a) Chlorosis and Anæmia.

Among all forms of disease chlorosis is the one most frequently treated at St. Moritz. In classing it with the other forms of anæmia we are simply following an old custom, although the view is constantly gaining ground that chlorosis as a disease *sui generis* must be included among nervous disorders, and that the anæmia which characterizes it is only one of its principal symptoms.

In judging of the therapeutic value of St. Moritz in this disease we must be guided by its intensity, and must further convince ourselves that we are not dealing with a case of disguised tuberculosis.

Severe cases of chlorosis, such as have lasted without intermission for years, and are probably to be ascribed to the vascular changes described by Virchow, are influenced but little if at all by St. Moritz. In such cases deficient production of heat may even render removal to a milder climate necessary.

Chlorosis which assumes this severe character only at intervals, for instance every spring, may be completely cured at St. Moritz, but as a rule only after a repetition of the treatment in the second year.

The most favourable cases are those in which the malady has originated in accidental causes, at the period of puberty, for instance, in a completely sound body. Such cases are generally put in the way of complete recovery by a single course of treatment.

Chlorosis in children deserves special attention. In families in which it is hereditary, the children at the age of ten or twelve years begin to show symptoms pointing to the appearance later on of severe chlorosis. In such cases a course of treatment annually repeated is an excellent prophylactic, generally preventing the outbreak of the disease.

Anæmia is an important concomitant symptom of the diseases to be mentioned later on, but it may also occur as a chronic sequela to other maladies, forming a disease in itself.

Such cases of anæmia are in a high degree susceptible to successful treatment at St. Moritz. The majority of patients of this category are women weakened by too frequent or severe accouchements. As a rule the improvement is rapid and permanent,—unless another pregnancy follows too quickly. Then too there are many cases of anæmia following acute diseases, especially typhoid fever, and generally denominated "difficult convalescence." Here also a favourable effect is soon produced. A third class is formed cases of anaemia following too drastic treatment (with mercury, alkaline waters, etc.). Here also satisfactory results are obtainable at St. Moritz.

(b) Tuberculosis and Scrofula.

Chronic tuberculosis in all its various localisations is treated at St. Moritz. Of course pulmonary consumption is by far the most common form; about this we shall have more to say further on. Next in frequency comes tuberculosis of the lymphatic glands, of the bones, and of the urogenital organs.

Nowadays no medical man, and but few patients, would expect to cure a case of tuberculosis by a stay of a few weeks' duration at St. Moritz. On the other hand recent investigations render it probable that local tuberculous diseases are cured much more frequently than was formerly supposed. This is not the work of weeks, however, but of months and years, and is effected by so strengthening and invigorating the system as to enable it to master the destructive process by the healing principle (always present *a priori* in tuberculous disease) of the reaction of the connective tissue, thus rendering the cells victorious in their conflict with the bacillus.

This general fortifying of the system, which is the first step towards a cure, can often be more readily effected by a course of treatment at St. Moritz than by any other therapeutic measure; afterwards all due precaution must be taken not to stray from the narrow path leading to restored health.

It is with a view of effecting a general invigoration of the constitution that St. Moritz can be recommended as a *prophylactic* for young people with healthy lungs but hereditary tendency to consumption. But this prophylactic measure can only be of benefit when it is extended over a series of years, and when no prejudicial influences are allowed, in the intervals, to jeopardize the success of the treatment.

If in addition to tuberculosis we speak also of *scrofula*, this is because in our opinion there are cases of scrofula which are not of a tuberculous nature. We refer to simple hyperplasia of the lymphadenoid tissue, whether agglomerated in the lymphatic glands or isolated in the mucous membranes. As long as such deposits have not become tuberculous, or enclosed in a stiff fibrous stroma, they may be influenced in the most favourable manner, and even cured, by a prolonged stay at St. Moritz. We refer chiefly to adenoid growths in the naso-pharyngeal space, granular pharyngitis, and swellings of the tonsils and lymphatic glands, all in children.

(c) Rheumatism and Gout.

In general it may be said that all rheumatic affections, in the narrower sense of the words, run the risk of being aggravated at St. Moritz. But there is one exception to this rule, namely the so-called *rheumatic* œdema. This is an œdema of variable but often obstinate character; it makes its appearance now here, now there, without albumen in the urine, without affections of the heart or kidneys, but always attacking persons with a tendency to rheumatism. In default of a better explanation we may assume that the *materia peccans* of rheumatism is in such cases localised in an abnormal manner in the subcutaneous cellular tissue. However this may be, it is certain that a number of invalids of this class have been cured of their disorder by a course of treatment at St. Moritz, after having in vain sought alleviation elsewhere.

With *gouty diathesis* the case is different: it appears to be favourably influenced at St. Moritz, if the patient is not too plethoric. This at least would seem to be the case, judging from the fact that the first medical authorities,—specialists in the treatment of this disease,—annually send a number of gouty patients to St. Moritz. A stay here does not, however, preclude the possibility of an attack, nor diminish its intensity. Any attempt to explain the favourable influence of our health-resort upon gouty diathesis would necessarily be conjectural. We have already remarked that there is no diminution of the excretion of uric acid through the influence of the mountain-climate,—at least not in healthy persons.

(d) Albuminuria and Diabetes.

Bright's disease, as a general affection, is not suited for treatment at St. Moritz. The process in the kidneys of course remains the same, but under the influence of the climate the concomitant symptoms, namely those of the heart and lungs, may be aggravated.

On the other hand we are occasionally called upon at St. Moritz to treat cases of chronic nephritic disease which have existed for years with a *copious* excretion of albumen, but with only a trifling reaction upon the other organs and the general nutrition of the body. Such patients find St. Moritz agree with them, and gain strength, but the quantity of albumen excreted remains about the same.

On the other hand I know of several cases of *albuminuria in adolescence* which have been permanently cured at St. Moritz, having had occasion to observe the patients both before and after treatment. In my opinion it is a question here not of a diseased action of the kidneys, but of an abnormal condition of the albumen in the blood.

In *diabetes* my experience is as follows: as long as glucosuria is the only symptom, without reaction on the entire system, St. Moritz agrees well with the patient and may be useful as a tonic, though it has no influence upon the excretion of sugar. In cases of pronounced diabetes I have never seen any improvement worth mentioning.

(e) Syphilis.

Of course there can be no question of a specific effect at St. Moritz; but not unfrequently secondary and tertiary forms of acquired syphilis, and late forms of hereditary lues, come for treatment to our health-resort. My observations on this class of patients may be briefly stated as follows:

1. In many obstinate cases there are periods in which the tonic treatment must take the place of the specific. St. Moritz then exercises a most beneficial influence.

2. In recent cases, which are generally sent to our health-resort under a false name, specific treatment may be successfully combined with the general treatment.

3. Anæmia and debility due to mercurial poisoning are influenced in a most favourable manner by St. Moritz.

(f) Malaria.

The mountain climate has long been regarded as a specific against malarial illnesses,—less in the case of recent infections than in the chronic debility which follows. In this instance the chalybeate springs and the baths form a valuable auxiliary to the influence of the climate, and at St. Moritz we have successfully treated cases that were in reality not far removed from malarial cachexia. The majority, indeed, of the malarial patients visiting our health-resort only exhibit symptoms of severe anæmia accompanied by enlargement of the spleen, tendency to slight attacks of fever after every exertion, dietetic troubles at the period of menstruation, and neuralgia of an intermittent character.

II. Organic Diseases.

(a) Anomalies of Circulation.

There can be no question here of anything except general disturbances of the circulation arising from defective action of the heart. Of course even at St. Moritz there can be no possibility of remedying irreparable defects, lesions, strictures, etc., but only of a better nutrition of the cardiac muscle and a strengthening of the compensatory hypertrophy. In this direction a stay at St. Moritz, in suitable cases, has a permanently beneficial effect,—as I several times had occasion to observe in cases coming under my notice before Oertel's great work had influenced the general views regarding the therapeutics of disturbances of the circulation.

In order that an anomaly of circulation may be corrected by the strengthening and increased action of the cardiac muscle, it is absolutely necessary that the latter be permanently in favourable conditions of nutrition. When this is no longer the case the disturbance makes itself felt in its various degrees. It depends upon the intensity of these disturbances whether they are susceptible of being favourably influenced at St. Moritz, or whether the initial exciting effect of the climate is so intense as to preclude a further stay at the health-resort, so that the tonic effect of the climate has no time to operate.

This of course excludes cases of cardiac cachexia, as well as asystole with permanent wide-spread œdema, relative insufficiency of the tricuspid valves, etc. Where, on the other hand, in consequence of debilitating influences, chlorosis, intercurrent acute diseases, rapid growth, the climacteric period, etc., the compensation has so far suffered that oppression of the chest, œdema of the ankles, etc., make their appearance, I have seen permanent relief afforded by treatment at St. Moritz. It must be expressly remarked, however, that this applies to cases in which there is no doubt as to the diagnosis and no possibility of anæmic sounds having been falsely interpreted. As a general rule it is a question of diseased mitral valves, but I know several young people with defective aorta, who visit the mountains for a few weeks every year, undertake pedestrian tours requiring no extraordinary exertions, but still quite of respectable length, and find their health none the worse either at the time or afterwards.

Corporal exertion in the mountains also has a favourable effect upon idiopathic hypertrophy of the heart, as soon as the initial stage of increased palpitation is over. (By the way, this disorder seems to be much commoner than is generally supposed,—many mountain-guides and chamois hunters have an enlarged heart). The palpitations, however, may become so violent that a further stay in the rare mountain air would be inadvisable. This applies especially to excitable individuals in whom the overgrowth is the result of nervous palpitations. Hypertrophy of the heart in interstitial nephritis, and hypertrophy occurring during the period of growth, are as a rule unsuited for the climate of St. Moritz.

Of disturbances of circulation having their origin outside the heart, atheroma of the arteries and pulmonary emphysema would be the most likely to be sent here for treatment. It has been stated above that every year quite a number of elderly atheromatous patients visit St. Moritz, returning home not only without having been attacked by thrombosis or apoplexy, but, on the contrary, invigorated in body. Not that every case of atheroma is suited for St. Moritz, or that this malady does not justify hesitation. (A diagnosed aneurism should in no case be sent to the Engadine). We shall have more to say of emphysema further on, but may mention here that the favourable influence of St. Moritz is perhaps in many instances to be attributed to a strengthening of the right ventricle.

Of diseases chiefly affecting the parietes of the heart, inflammatory processes are of course not suited to St. Moritz. On the other hand *fatty heart* and *fatty degeneration of the cardiac muscle* deserve great attention. The former is often observed at St. Moritz, and it has been remarked above that women in the climacteric age, with incipient fatty heart and hydræmic blood, are among the best cases for treatment at St. Moritz. That dietetic rules, etc., must be observed is a matter of course, but the principal share in the cure must be ascribed to the influence of the climate.

Fatty degeneration of the cardiac muscle in the exact sense of the words, accompanied by a dilatation of the ventricles, is not suited to St. Moritz. Its incipient stages, however, are difficult to recognise *intra vitam*, and cannot therefore be unreservedly admitted into the catalogue of indications. But with this reservation I would maintain, on the basis of my own experience, that the incipient stages of fatty degeneration occurring in chronic debility, especially in premature climacteric changes or in overworked men, may be completely cured by a course of treatment at St. Moritz,—perhaps only when in the transitory stage described by pathological anatomists as "albuminoid clouding" of the muscular fibres, not yet amounting to fatty degeneration.

(b) Diseases of the Respiratory Organs.

Of this class of maladies, St. Moritz exercises the most favourable influence on those in which the nervous element plays a chief part, namely *asthma* and *hay fever*.

I have known asthmatic patients who, after one or more courses of treatment at St. Moritz, were not only exempt from the attacks during their stay there, but also after their return home were subjected to them very much less frequently, or not all. These were cases of purely nervous asthma, in which the catarrhal complication was absent, or played only a subordinate rôle.

Whether in the observed cases of hay fever the result was permanent, could not be ascertained; but at any rate almost all those afflicted with it felt very well during their stay at St. Moritz, and their general health was improved.

This anti-spasmodic effect may perhaps be the cause of the improvement in health experienced at St. Moritz by many sufferers from *emphysema*. *A priori* it might be supposed that the thin air of the Engadine would be prejudicial in every case of emphysema. That this is not so, experience has long shown, and accordingly the general rule was laid down, that St. Moritz was indicated for slight, but contraindicated for severe emphysema. The principle thus deduced from theory is unsound. There are persons with unimportant emphysema who are obliged to leave the Engadine on account of marked and continuous dyspnœa, while on the other hand there are severe cases of emphysema in which the patient feels as well as ever both during and after his stay here. This fact is difficult of explanation.

The momentarily favourable effect probably occurs where spastic contractions of the bronchi are associated with and increase the dyspnœa of the emphysema; the permanent secondary effect is perhaps to be attributed to the strengthening of the right ventricle muscles, which diminishes the stasis of blood in the lungs.

Inflammatory conditions of the bronchia, whether existing independently (as a simple chronic catarrh), or dependent upon lesion of the pulmonary tissue, are ***not*** generally adapted to St. Moritz. And this is specially the case as regards laryngitis, which is more favourably influenced by a less dry, woodland air, at a moderate elevation. In the Engadine the differences of temperature are too considerable, and the irritating effect of wind and dust cannot always be avoided, even when the utmost care is exercised, to as full an extent as the circumstances require.

We have given our opinion above regarding the effect of the summer climate of St. Moritz upon tuberculosis in general; here we may say a few words regarding its most frequent localisation, *pulmonary consumption.*

Tuberculosis of the larynx, great irritability of the bronchial mucous membrane, much coughing and copious expectoration, hæmoptysis, fever, and in general all the signs of the *progress* of the disease, are conditions which only in rare cases permit us to expect a favourable effect from St. Moritz. On the other hand, in every case of chronic tuberculosis there are intervals of rest, in which the pulmonary disease is so to speak in a latent stage. This is the right period for a course of treatment at St.

Moritz, from which all the more may be expected in case it does away with two complications which very often hinder the process of recovery, namely anæmia and dyspepsia.

The fear of reawakening the tuberculous process in such stationary cases by a reasonable course of treatment with iron, or of inducing hæmoptysis, is just as devoid of foundation as the belief that a rarefied air favours the occurrence of pulmonary hæmorrhage.

In this sense, but in this only, we can recommend our health-resort for pulmonary phthisis, laying down the maxim that *St. Moritz is a suitable summer-resort for consumptives who neither cough nor display feverish symptoms.*

Of the diseases of the *pleura*, the first to be considered are serous remains of pleuritic exudations, remaining unabsorbed after acute pleurisy. Such I have repeatedly seen disappear in a relatively short time during a course of treatment at St. Moritz. In what manner, too, fibrous elevations and fresh, not yet organized adhesions are favourably influenced here it would be difficult to say. Certain it is that the accompanying pain and the interference with the voluntary and involuntary movements of the trunk may cease, rendering it probable that under the influence of the more energetic circulation and respiration a partial absorption of the fibrinous exudations takes place. Residence at St. Moritz has no direct influence upon purulent or tuberculous pleurisy.

(c) Diseases of the Organs of Digestion.

Chronic catarrh of the stomach, dilatation, and gastric ulcers are aggravated by treatment at St. Moritz, but the effect is beneficial in all dyspepsias and gastralgias not accompanied by a catarrhal state of the mucous membrane of the stomach nor due to a too copious production of acids.

The effect is the most striking in those cases of *dyspepsia* which are concomitants of disturbances of nutrition such as are favourably influenced at St. Moritz, namely anæmia, chlorosis, tuberculosis, malaria, hysteria, and neurasthenia. In particular, the *circulus viciosus* which connects anæmia with dyspepsia, and often obstinately defies every medicine, is severed remarkably quickly by a course of treatment at St. Moritz. The atonic form is the most easily cured, while the flatulent form is the most obstinate.

Liver complaints are not influenced by the curative agents of St. Moritz, nor are chronic catarrhs of the intestines. On the other hand *atonic conditions of the intestines*, such as often accompany the above-mentioned disturbances of nutrition, and generally produce constipation, but occasionally also diarrhœa, are much improved by treatment at St. Moritz. In hæmorrhoids the use of the chalybeate waters often induces an irritated condition; but after exhausting losses of blood from this complaint, St. Moritz may under certain circumstances render valuable service.

(d) Diseases of the Nervous System.

Any great influence upon patients suffering from *organic* changes in the central nervous organs cannot be expected from St. Moritz; most benefit would probably be derived in the pre-ataxic stage of tabes. In some cases observed by me the patients seemed to be benefited, in others not.

Functional derangements of the nervous system, unaccompanied, so far as known to us, by anatomic changes, are not by any means all suited for St. Moritz. Epilepsy is always unfavourably influenced, and in most cases chorea also. *Basedow's disease* must be in its initial stages, and remain exposed to the influence of the Alpine climate for several months without interruption, before any improvement can be effected. A case of *angina pectoris* arising from nicotine poisoning, and another resting on a hysteric basis, were cured at St. Moritz. On the other hand, in *neurasthenia* and *hysteria* our health-resort has a very wide field open to it.

Neurasthenia, in its various degrees from slight "nervousness" to serious cases of cerebrasthenia and spinal irritation, assumes from year to year a more important place among the various forms of disease treated at St. Moritz. Perhaps this is partly attributable to the fact that while formerly this malady excited only an incredulous smile, it now receives full attention from physicians; but beyond this, it is certain that neurasthenia is constantly on the increase. The principal reason, however, probably is that such excellent results are attained in neurasthenia by treatment at St. Moritz. Slight cases, especially when accompanied by anæmic conditions, are for the most part entirely cured, though the improvement is often noticeable only after the patient's return home. Severe cases are at least considerably alleviated, often permanently so, if the exciting causes can be removed. The improvement seldom takes place during the treatment; thus it often happens that patients leave the health-resort in a state of dejection, resolved never to return to it, but are among the first to arrive at the springs the next season, saying that it is long since they had "such a good winter."

Hysteria has a prospect of alleviation and cure when it is due to anæmic conditions or organic diesases which yield to treatment at St. Moritz. As a rule convulsive forms must be excluded.

Neuralgias resulting from malarial infection or chloro-anæmia can be cured at St. Moritz along with the malady that originates them; but here too they are sometimes remarkable for their obstinacy.

The term *migraine* is much misused by patients. All kinds of periodically recurring pains in the head are classed under this name. This circumstance, and the obscure ætiology of the malady, render it very difficult to designate the cases which may be favourably influenced by our health-resort. We can therefore do no more than record the fact that several genuine migraines have been cured or alleviated at St. Moritz, while others have remained unaffected by the treatment.

(e) Diseases of the Urogenital Apparatus.

Among these, *anomalies of menstruation* occupy the first rank. Amenorrhœa and dysmenorrhœa, resting on an anæmic or nervous basis and not occasioned by mechanical obstructions, are often strikingly alleviated at St. Moritz. The profuse menstruation of anæmic patients, resulting from an insufficient plasticity of the blood, is also favourably influenced.

Leucorrhœa, which may be either the cause or the result of anæmic conditions, sometimes disappears entirely in the course of the treatment. The seat, the duration, and the intensity of the catarrh of course have very great influence upon the prospect of a cure.

Inflammations in the perimetrium, or in the parenchyma of the uterus and the ovaries, should not be subjected to treatment at St. Moritz until the subacute painful stage has passed.

Sterility is frequently treated here. If it results from one of the above-mentioned maladies it may be cured at St. Moritz. But here the maxim "*videatur et altera pars*" may with reason be applied more often than is usually assumed.

(f) Diseases of the Skin and the Organs of Sensation.

Patients with a tendency to eczematous affections of the skin often suffer from relapses in the lofty mountain air, unless they are careful to keep the exposed surfaces supple by the use of emollients. I have observed a directly curative influence in skin diseases only in a few cases of chronic *furunculosis*, but in these the success was certainly astonishing.

Diseases of the eye are as a rule contraindicated, as those organs are always thrown into a more or less congested state by the influence of the climate. In *trachoma*, however, the effect is said to be beneficial; I myself have had no opportunity of observing a case.

Singing in the ears, due to neurasthenia, may disappear at St. Moritz. Occasionally patients with dry inflammation of the middle ear come to St. Moritz hoping that the rarefied air will favourably influence their retracted *membrana tympani.* I have never known any good result.

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In conclusion I subjoin a table of the first thousand cases of illness observed by me at St. Moritz, with the sole object of giving the reader an idea of the proportion in which the various diseases are represented at our health-resort.

Chlorosis	108
Anæmia	104
Tuberculosis	51
Scrofula	23
Rickets	5
Leucocythæmia	8
Rheumatism	6
Gout	19
Albuminuria	14
Diabetes	11
Obesity	9
Syphilis	12
Malaria	28
Valvular disease	18
Fatty degeneration of the heart	26
Asthma	13
Hay fever	5
Emphysema	15
Bronchial catarrh	6
Pleurisy	9
Gastric catarrh	13
Carcinoma ventriculi	2
Dilated stomach	7
Gastric ulcer	3
Gastralgia	9
Dyspepsia	54
Intestinal catarrh	14
Liver diseases	10
Hæmorrhoids	6
Locomotor ataxy	8
General paralysis	2
Infantile paralysis	3
Epilepsy	3
Chorea	7
Neurasthenia	81
Hysteria	27
Morphiomania	4
Hypochondriasis	5
Morbus Basedowii	4
Angina pectoris	7
Migraine	19

Neuralgia	25
Anomalies of menstruation	41
Leucorrhœa	29
Metritis	20
Perimetritis	14
Oophoritis	8
Uterine and ovarian tumours	9
Vaginismus	3
Sterility	23
Impotence	6
Gonorrhœa	7
Prostate hypertrophy	3
Catarrh of the bladder	3
Spermatorrhœa	6
Pharyngitis	7
Otitis media sicca	4
Acne	3
Furunculosis	4
Various	7